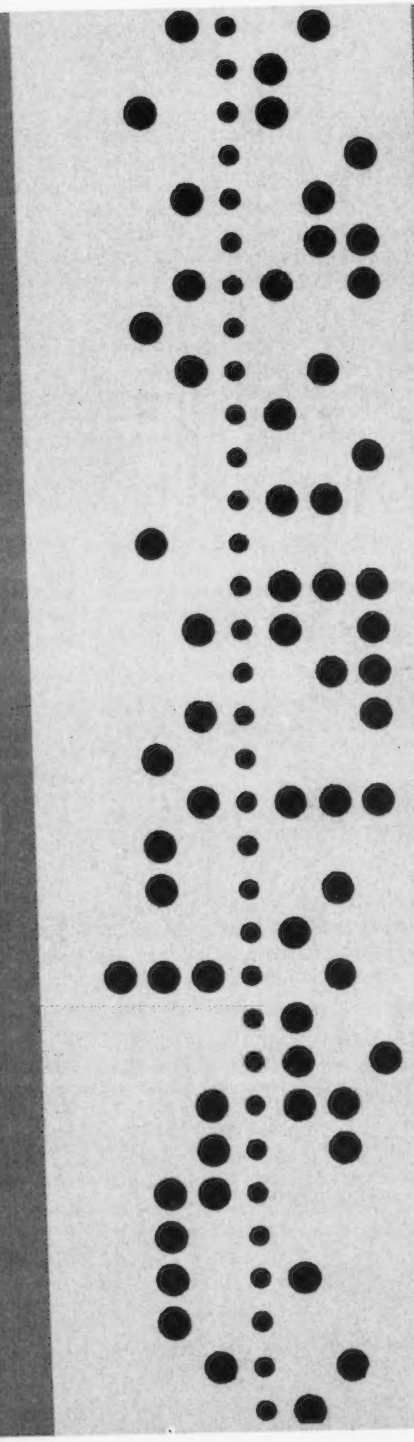
May 5, 1965

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



A Semi-monthly Abstract Journal for Science and Industry

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May 5, 1965 / Volume 40, Number 9

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

Issued twice a month by the Clearinghouse for Federal Scientific and Technical Information (formerly Office of Technical Services). Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Address changes should be sent to Superintendent of Documents.

PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS (formerly U.S. Government Research Reports) is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability to the public of new reports of U.S. Government-sponsored research and development released by the Department of Defense and other Federal agencies. The Atomic Energy Commission and the National Aeronautics and Space Administration issue their own announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by accession/report number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes. Reports of current high industrial interest are featured in "Research Highlights."

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting accession/report numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the various indexes will aid in locating those reports. Cumulative indexes are published periodically.

TO ORDER REPORTS

Order reports by accession/report number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Superintendent of Documents deposit account. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. Reports available are listed in the following journals open to public subscription from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $25 a year domestic, $31 foreign, $1.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

special ANNOUNCEMENTS

NASA REPORTS AGAIN BEING ANNOUNCED

Research and development reports from the National Aeronautics and Space Administration that are to be sold by the Clearinghouse are again being announced in USGRDR. At present they will not be listed in the indexes.

RELIABILITY ABSTRACTS OFFERED ON SUBSCRIPTION

The Clearinghouse for Federal Scientific and Technical Information is selling subscriptions to the National Aeronautics and Space Administration monthly publication, Reliability Abstracts and Technical Reviews. The publication rapidly abstracts and rigorously analyzes material in the current literature on reliability. Begun by NASA in April 1961, it alerts engineers and scientists to the latest developments in the theory and practice of reliability, especially as they apply to space technology.

The development of the general field of reliability began about 30 years ago as a sort of statistical quality-control technique for mass-produced commodities. What is new in reliability is the intensive application of its concepts and procedures, notably to space equipment, which must not only be built to operate in a hostile and sometimes undefined environment, but also without the experience available from mass-production statistics. Most spacecraft and propulsion systems are few-of-a-kind.

Under contract to NASA, a team of scientists and statisticians at the Research Triangle Institute, Durham, N. C., surveys current papers on reliability and closely related subjects from all available sources. Each month they search five or six dozen journals, reports, and proceedings of conferences and transactions.

The significant feature of the abstracting is to subject the contents of the original source document to searching critical analysis, something rarely encountered in abstracting services.

Reliability Abstracts subscriptions are on a calendar year basis beginning in January. Subscribers who order later in the year will receive back issues from January. An annual index is included in the subscription price.

The abstracts cost $15 per year starting with January 1965. The 1965 abstracts will be identified as Volume V and will be distributed monthly.

Back volumes are also available at $15 each. They are:

Volume I, April 1961 - May 1962
Volume II, June 1962 - May 1963
Volume III, June 1963 - May 1964
Volume IV, June 1964 - December 1964

Orders are being accepted now. Order from The Clearinghouse, U. S. Department of Commerce, Springfield, Va. 22151.

A SINGLE INDEX FOR NEW FEDERAL R& D REPORTS

A new Clearinghouse publication provides scientists, engineers, librarians and management with a single index to new unclassified Government-sponsored technical reports.

Entitled Government-Wide Index to Federal Research and Development Reports, it will be made up from machinable index records prepared by the Atomic Energy Commission, National Aeronautics and Space Administration, Department of Defense, and the Clearinghouse.

Government-sponsored research reports included in the following agency announcement journals will be indexed in the new publication:

Nuclear Science Abstracts (AEC)

Scientific and Technical Aerospace Reports (NASA)

Technical Abstract Bulletin (Defense Documentation Center)

U.S. Government Research and Development Reports (Clearinghouse)

Appearing the 15th of each month, the Government-Wide Index will list the reports announced during the previous month.

For this project, the Clearinghouse is initially using the computer facilities of the Aerospace Research Applications Center at the University of Indiana. The journal records, in the form of punched paper tapes, magnetic tapes, and cards, are fed into the computer which merges them into a single index under the five access points of subject, corporate author, personal author, accession number and report number.

How to Order

The Government-Wide Index to Federal Research and Development Reports will be printed and sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. Price is $10 for a one-year subscription (12 issues); add $2.50 for foreign mailing; single issue, $1.25. Make remittance payable to Superintendent of Documents.

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Reports of current high industrial interest

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Data Processing

AUTOMATIC PICTORIAL ANALYSIS RESEARCH

Picture digitizing equipment now under construction may be able to convert pictorial transparencies into electrical signals in digital form and record these signals on digital magnetic tape for computer input. The equipment may also accept suitable formatted digital tape recordings and display them in pictorial form for photographic recording, according to Air Force-sponsored research. Objective pictorial analysis is now possible using simple models developed for picture subdivisions. The models help determine mean brightness differences and give results closely similar to observers' judgments. In developing the models, the researchers experimented with one-dimensional pictorial stimuli in which the stimulus brightness (or density) is constant in one direction and varies only in the other. Such stimuli may be thought of as representing single scans across real-world (two-dimensional) pictures. The use of such stimuli makes it possible to study basic textural stimulus variables nearly independently of the form and pattern variables, which otherwise make the subdivision process highly multivariate. Order from the Clearinghouse AD-609 711, HC $4.00/MF $1.00; STUDY OF PICTORIAL DATA ANALYSIS CONCEPTS AND TECHNIQUES.

Electronics

NEWSLETTER COVERS NAVY'S MICROELECTRONICS PROGRAM

MICRO-NOTES, a newsletter that describes in depth the Navy's progress in microelectronics for integrated electronic circuit assemblies, has been prepared by field stations of the Avionics Division of the Bureau of Naval Weapons. The publication describes microelectronics R&D as applied to airborne electronic equipment. It provides information on the evaluation, application, availability of microelectronic hardware, and standardization activities pertaining to state-of-the-art circuits, devices, and materials. The following may be ordered from the Clearinghouse:

MICRO-NOTES	1, AD-278 699, July 1962, HC only, $5.60.
"	2, AD-291 239, Nov. 1962, HC only, $4.60.
"	3, AD-409 636, June 1963, HC only, $15.00.
"	4, AD-424 745, Oct. 1963, HC only, $10.50.
"	5, AD-434 109, Apr. 1964, HC only, $14.50.
"	6, PB-166 834, June 1964, HC $5.00/MF $1.25.
"	7, PB-166 831, Aug. 1964, HC $7.00/MF $1.75.
"	8, PB-166 832, Oct. 1964, HC $5.00/MF $1.00.
"	9, PB-166 833, Dec. 1964, HC $7.00/MF $1.75.
"	10, AD-612 060, Feb. 1965, HC $4.00/MF $1.00.

(No. 6 is cited in this issue on page S-10; No. 8 on page S-9; No. 9 on page S-10.)

Fuels

AVIATION FUEL SAFETY

Most accidental fires and explosions occurring in the use of aviation fuels result from a critical combination of randomly occurring factors; therefore, safety is more a function of equipment design, proper handling techniques, and rigorous precautions. The adoption of a single type aviation turbine fuel by the entire industry probably would not significantly improve the present excellent safety record of commercial aviation, according to an FAA-sponsored study group. Present success in prevention is due mainly to preventing inadvertent fuel fires by isolation and/or elimination of ignition sources. Additional research is needed on the nature and effect of lightning strikes and electrostatic discharges. Research has been conducted on keeping the vapor space of fuel tanks filled with inert nonflammable gas, but this approach has numerous problems which prevent its adoption by commercial aviation. There is almost a complete lack of information regarding the details and extent of fuel spray and mist formation under actual flight conditions. The same is true regarding localized vapor-air mixtures. Order from the Clearinghouse AD-612 760, HC $3.00/MF 75 cents; AVIATION FUEL SAFETY. (This report cited in this issue on page 53.)

Low-Temperature Materials and Processes

SAFETY MEASURES ESSENTIAL WHEN WORKING WITH CRYOGENIC LIQUIDS

Frostbite, pressure, asphyxiation, and explosion are a few of many hazards present when cryogenic liquids are being used in a laboratory. Pressure is a danger in containers where the liquids change to gas and build up a pressure until the vessel bursts. Asphyxiation can occur when gas is released into a room and lowers oxygen concentration. Explosion is a severe problem when highly inflammable fluids like hydrogen are used near electrical equipment. Brookhaven National Laboratory, a large user of cryogenic liquids in research programs, has instituted a variety of safety measures, including the establishment of a committee to study apparatus before it is operated in any of the buildings. Other safety measures involve ducting to vent gases rapidly, safety vents to allow exit of excess pressures in vessels, special-type viewing glass that will not shatter in the event of an explosion. Order from the Clearinghouse BNL-7858, HC $1.00/MF 50 cents; CRYOGENIC SAFETY AT BROOKHAVEN NATIONAL LABORATORY.

Management Control, Decision Systems

PERIODIC PROCESS EVALUATION

A new plan developed for the AEC aids in the economical final production of highly reliable complex systems involving too much expense to adequately test during final acceptance testing. The plan assures that production processes are capable of producing material in accordance with design intent. It involves the control of product variation due to manufacturing through rigid production process controls. This is accomplished by mutually establishing minimum process control requirements for selected processes; periodically evaluating actual processing to determine the degree of conformance to minimum control requirements; scoring each evaluated process according to the seriousness of detected discrepancies in relation to their possible effect on product; and the concentration of overall effort and corrective action on those processes having unsatisfactory status or condition. Order from the Clearinghouse TID-19301, HC $1.00/MF 50 cents; PERIODIC PROCESS EVALUATION.

STAINLESS STEELS RESISTANT TO STRESS CORROSION

Stress-corrosion tests on salt-coated AM-350 CRT, AM-350 DA, AISI 301, PH 15-7 Mo, PH 14-8 Mo, and AM-367 specimens show these stainless steels to be resistant to stress-corrosion cracking at 550°F, NASA metallurgists advise. Specimens of AM-350 DA and AM-367 are very susceptible to stress-corrosion cracking in both indoor and outdoor exposures at ambient temperatures, whereas AM-350 CRT, AISI 301, PH 15-7 Mo, and PH 14-8 Mo display excellent resistance to stress corrosion in these environments. Specimens of AISI 301, PH 15-7 Mo, AM-350 DA, and AM-367 show varying tendencies to pitting in exposures at 550°F and also indoors and outdoors at ambient temperatures. The stainless steels with higher austenite contents generally appear to have better resistance to the corrosive effects of salt at room and elevated temperatures; however, the effects of severe cold reduction appear to promote pitting in the all-austenitic AISI 301. For better corrosion properties in these stainless steels, heat treatments or alloy compositions that cause the precipitation of carbides in the grain boundaries should be avoided. Order from the Clearinghouse N65-12303, HC 50 cents/MF 50 cents; THE SUSCEPTIBILITY OF SIX STAINLESS STEELS TO STRESS CORROSION AT AMBIENT AND ELEVATED TEMPERATURES.

STRESS-AGING IMPROVES ULTRA-HIGH-STRENGTH STEELS

Stress-aging imparts considerable improvement in strength properties for several ultra-high-strength steels without effective concurrent losses of elongation, reduction of area, or relative toughness, Army researchers say. Stress-aged 300M appears to be the first low alloy steel to provide a 0.1 percent offset yield strength of 300,000 psi — estimated over 320,000 psi for stress-aged sheet material. The treatment consists of heating alloys, composed wholly or in major part of a solid-solution phase or phases, while the material is subjected to essentially elastic stress from an external load. For 300M maximum stress-aged strengthening yielded the following increases: 75,000 psi in proportional limit, 90 percent in elastic capacity, and 62,000 psi in 0.1 percent offset yield strength. Also exhibiting considerable improvements in strength properties are 4340 Air-Melted, 4340 Vacuum-Melted, and 4335 Si-Modified. Order from the Clearinghouse AD-612 462, HC $1.00/MF 50 cents; STRESS-AGING: A NEW TREATMENT FOR ALLOYS, PART 3: EFFECT ON STANDARD TENSILE PROPERTIES OF FOUR ULTRA-HIGH-STRENGTH STEELS. (This report cited in this issue, see page 87.) Earlier reports are: AD-430 978, HC $1.50; STRESS-AGING: A NEW TREATMENT FOR ALLOYS, PART 1: EFFECT ON STANDARD TENSILE PROPERTIES OF STAINLESS STEELS, and AD-609 243, HC $3.00/MF 75 cents; STRESS-AGING: A NEW TREATMENT FOR ALLOYS, PART 2: EFFECT ON STANDARD TENSILE PROPERTIES OF 4330 TYPE STEEL.

Plasma Technology

CONTROLLED FUSION AND PLASMA RESEARCH

An AEC literature search on controlled fusion and plasma studies contains 3657 annotated references to reports and journal articles. Subjects covered include fusion reactions, plasma physics, magnetohydrodynamics, magnetic fields, and other topics related to controlled fusion. The references are listed by country and organization and were selected from Nuclear Science Abstracts from June 1962 through June 1964. This document supplements three earlier searches—TID-3557, TID-3557(Suppl. 1), and TID-3072(Rev. 1). Together, these four publications cover most of the world's important literature on controlled fusion research from 1950 through early 1964. United States publications are listed first, with other countries following in alphabetical order. All four searches and many of the documents cited are available from the Clearinghouse. Order from the Clearinghouse TID-3557(Suppl. 2), HC $6.00/MF $2.50; CONTROLLED FUSION AND PLASMA RESEARCH, A LITERATURE SEARCH. TID-3557 HC $2.25; TID-3557(Suppl. 1) HC $3.00; TID-3072(Rev. 1) HC $2.75.

Printing, Graphic Arts, and Photography

TERRAIN EMBOSS

Terrain emboss is a useful technique for producing terrain models, photographs of which can be used directly as shaded relief portrayals on charts and maps. The portrayals, Air Force cartographers say, compare favorably in quality and realism with those prepared by conventional manual methods. The technique is relatively easy to learn and rapid in execution. Significant savings in both calendar time and man hours can be realized when compared to other methods of producing shaded relief imagery. The present airbrush and hand-rendering methods, while capable of producing excellent portrayals, consume a large amount of time, varying with the size, scale, and complexity of individual charts. There is also a problem of obtaining uniform tonal densities and interpretations of terrain from among adjoining charts so that consistent matches can be made. Order from the Clearinghouse AD-610 582, HC $2.00/MF 50 cents; TERRAIN EMBOSS.

Transportation (Land, Sea, Air, Space)

DOPPLER AND INERTIAL NAVIGATIONAL SYSTEMS

Both the doppler and inertial navigational systems can be used successfully in domestic airline operations. Subject to certain procedures, every encouragement should be given to operators (including general aviation) to use these systems in domestic airspace, FAA-sponsored researchers advise. VORTAC should be used as the primary navaid for updating, but other aids may be used provided that the aircraft can be expected to remain within 10 nm of its indicated position 95 percent of the time throughout the flight. Flights originating within the United States should commence doppler or inertial operations from a VOR or VORTAC beyond the intermediate and low altitudes of the terminal area where air-traffic-control vectoring is to be expected. Likewise, flights terminating within the United States should cease doppler or inertial operations at a VOR or VORTAC before the terminal area. Order from the Clearinghouse AD-612 362, HC $4.00/MF $1.00; USE OF SELF-CONTAINED NAVIGATION AIDS IN DOMESTIC AIRSPACE.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-612 465 Div. 1, 28
CFSTI Prices: HC$2.00 MF$0.50

Bell Helicopter Co., Fort Worth, Tex.
CONTRACT ANALOG SIMULATOR EVALUATIONS: VERTICAL DISPLAY WITH HORIZONTAL MAP DISPLAY.
Technical rept.,
by J. H. Emery and D. J. Dougherty. Oct 64, 46p
Rept. no. D228-421-020
Contract Nonr167000

Unclassified report

Rept. on (JANAIR) Joint-Army-Navy Aircraft Instrumentation Research.

Descriptors: (*Display systems, Flight instruments), (*Flight instruments, Display systems), (*Helicopters, Flight instruments), (*Flight simulators, Analog systems), Navigational aids, Aeronautics, Human engineering, Pilots.

Evaluation was made of the pilot's ability to navigate and to perform simulated helicopter terminal area maneuvers using contact analog vertical display symbology alone and in the presence of the horizontal map display. Combinations of the grid, flight pathway and ground position indicator (GPI) on the vertical display with and without the map display were investigated. Performance measures were taken of the terminal area maneuvers including the landing approach, transition to hover, hover and touchdown. In general, the cruise portion of the flight could be accomplished as well when using the basic grid plane on the vertical display in the presence of the map display as when additional symbology (pathway and GPI) was presented on the vertical display. Performance on the approaches and transition to hover scores indicated improved performance with the additional information provided by the pathway and the GPI. It was concluded that precision of performance could be improved with the pathway and GPI navigation features on the vertical display but successful accomplishment of terminal area maneuvers was not entirely dependent upon this information. (Author)

AD-612 598 Div. 1, 14, 26
CFSTI Prices: HC$2.00 MF$0.50

Schjeldahl (G. T.) Co., Northfield, Minn.
LIGHTWEIGHT REINFORCED BALLOON MATERIAL INVESTIGATION.
Quarterly rept. for period ending 31 Dec 64,
by John A. MacFadden. 31 Dec 64, 32p
Contract Nonr409600, Proj. NR211 076

Unclassified report

See also AD-608 098.

Descriptors: (*Balloons, Polyethylene plastics), (*Polyethylene plastics, Balloons), Plastic seals, Sealing compounds, Tapes, Aging (Materials), Fibers, Payload, Reinforcing materials, Weight, Laminated plastics, Tests.

The leakage of balloons constructed of 0.25 mil (25-gage) Mylar and F-1-13 scrim (GT-66) has been determined to be caused by point blocking. This blocking results from adhesion of an adjacent layer of Mylar coming into contact with the flocking agent which holds the scrim threads together. Antiblocking agents were investigated and found ineffective. Modified adhesives were also investigated with negative results. The only solution found was to laminate Mylar to both sides of the scrim but the resultant balloon is too heavy for its original mission although it has uses in the medium payload range from 500 to 1500 pounds. Light gage Mylar as received from the supplier was investigated and found to be acceptable for zero pressure balloons. Manufacturing techniques using extreme care ('white glove' technique) were investigated and found feasible but did not solve the leakage problem. A new sealer to handle lightweight material has been developed and is now undergoing final tests. The ultimate solution to the problem of providing a lightweight, nonblocking balloon material appears to be to eliminate the flocking agent by laying adhesive-coated threads directly on light gage Mylar and curing the resulting web while it is separated by a release material. (Author)

AD-612 618 Div. 1, 25
CFSTI Prices: HC$9.75 MF$3.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STRUCTURAL MECHANICS OF THE AIRPLANE,
by A. A. Umanskii. 15 Mar 65, 676p
FTD-TT-63-274
TT 65-61835

Unclassified report

Unedited rough draft trans. of mono. Stroitel'naya Mekhanika Samoleta, Moscow, 1961, 529p.

Descriptors: (*Airplanes, Structural parts), (*Airframes, Mechanical properties), Fuselages, Wings, Aerial rudders, Stabilizers (Horizontal tail surface), Beams (Structural), Structures, Reinforcing materials, Structural shells, Flanges, Cylindrical bodies, Design, Loading (Mechanics), Stability, Metal plates, Mathematical analysis, USSR.

The volume is a study aid for the aviation high schools on the subject 'Structural Mechanics of the Airplane' which contains the fundamental theoretical basis for the static calculations set forth in the course 'strength calculations for the airplane.' The book sets forth the problems of complex beam bending, strength and stability of plates and shells, strength and bearing-ability calculations for structures of the wing and fuselage type, calculations for flat and three-dimensional girders, and a number of auxiliary problems with the appropriate mathematical apparatus. The book reflects the contemporary level of theoretical knowledge in the field of the structural mechanics of aviation structures, and may be employed by engineers in the industry in their practical work. (Author)

AD-612 807 Div. 1, 19
CFSTI Prices: HC$2.00 MF$0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF A DUAL RADAR ALTIMETER

INSTALLATION FOR USE WITH AN AUTOMATIC LANDING SYSTEM.
Final rept.,
by James C. Muir. Jul 64, 45p
Proj. 114 004 02V
SRDS RD-64-100

Unclassified report

Descriptors: (*Radar equipment, Altimeters), (*Altimeters, Instrument landings), (*Instrument landings, Altimeters), (*All-weather aviation, Instrument landings), Air traffic control systems, Civil aviation, Transport planes, Flight testing, Automatic, Landings, Feasibility studies.

An operational evaluation of dual pulse type radar altimeters, installed in a DC-7 transport aircraft, was conducted. Two Honeywell Model 7182 Radar Altimeters were integrated into an automatic landing system which used radar altimeter height information for vertical guidance during the flare-out and landing. A total of 391 automatic landings were made on 31 instrument landing systems during the evaluation period. Space position data from 109 runs were recorded on the ground-based phototheodolite camera system. Approaches over water and irregular terrain were made to observe the operation of the pulse altimeters over various approach terrain conditions. Based on the results obtained during this evaluation, it was concluded that simultaneous operation of dual radar altimeters in a large transport aircraft was feasible without mutual interference, and the automatic landing system performance when using pulse radar altimeter information was equivalent to that obtained when using frequency-modulated continuous-wave altimeter information with a substantial reduction in weight. It was recommended that the concept of using two pulse type altimeters be incorporated in the proposed FAA test phase of Category II and III airborne landing systems. (Author)

AD-612 948 Div. 1
CFSTI Prices: HC$2.00 MF$0.50

Systems Research and Development Service, Federal Aviation Agency, Washington, D. C.
EVALUATION OF IN-FLIGHT APPLIED WINDSHIELD RAIN REPELLENTS.
Technical rept.,
by Paul M. Rich and Charles R. Grisel. Dec 64, 38p
Proj. 314 002 01V
FAA-ADS 32

Unclassified report

Descriptors: (*Rainfall, All-weather aviation), (*Aircraft, Windshield wipers), (*Windshield wipers, Aircraft), Flight tests, Atmospheric precipitation, Raindrops, Visibility.

The type of rain repellents that can be applied in flight were evaluated to determine their effectiveness in improving windshield visibility during precipitation. The repellents were flight-tested on the FAA's Boeing 720 using the Boeing Rain Repellent Application System installed for the copilot's windshield. Comparative 16 mm. motion pictures were obtained of the pilot's and copilot's windshields during approaches to landing in precipitation. Laboratory tests were conducted to determine the effects of these repellents on glass and aluminum over a prolonged period and also to determine the repellents' freezing points. It was concluded that the Boeing Airplane Company's Type 1 and Type 3 rain repellents offer substantial improvement in windshield visibility during rain and, for light rain conditions, are most effective when used in conjunction with windshield wipers. It was also concluded that the U. S. Navy's Foster D. Snell, Inc. Rain Repellent was not compatible with the Boeing Application System and, therefore, could not be properly evaluated. (Author)

AD-612 949 Div. 1, 27
CFSTI Prices: HC$2.00 MF$0.50

Systems Research and Development Service, Federal Aviation Agency, Washington, D. C.
ANALYSIS OF ENGINE EXHAUST SYSTEM FAILURES IN GENERAL AVIATION AIRCRAFT.
Technical rept.,
by Gerald R. Slusher. Sep 64, 36p
Proj. 520 003 01X
FAA-ADS 29

Unclassified report

Descriptors: (*Aircraft engines, Exhaust systems), (*Exhaust systems, Aviation safety), Statistical analysis, Carbon compounds, Monoxides, Poisoning, Fires, Malfunctions, Heat exchangers, Manifolds (Engines), Exhaust diffusers, Failure (Mechanics).

A study and an analysis were made of the records on engine exhaust system malfunctions in the single engine type general aviation aircraft from the time period of 1958 through 1962 to determine the extent of the inflight hazards involving carbon monoxide poisoning, fire, power loss, etc. The results disclosed approximately 50 percent of the exhaust system failures occurred in the exhaust gas-to-air heat exchanger, 20 percent in the stacks or manifolds, and 20 percent internal to the muffler (baffles and diffusers). Nineteen illnesses and twelve fatalities out of 38 reported incidents of exhaust gases in the cabin were documented. Fourteen fires and 70 incidents of partial engine power loss or complete power failure were also reported. Analysis disclosed that the exhaust systems of newer aircraft fail at a markedly higher rate than the exhaust systems of older aircraft. (Author)

AD-613 061 Div. 1, 27
CFSTI Prices: HC$2.00 MF$0.50

Beech Aircraft Corp., Wichita, Kans.
LIMITING OF AIRCRAFT SPEED BY AUTOMATIC ENGINE THRUST CONTROL.
Technical rept.,
by H. A. Slingsby. Dec 63, 50p
Contract FA WA4639
FAA-ADS 12

Unclassified report

Descriptors: (*Speed regulators, Aircraft engines), (*Flight control systems, Speed regulators), (*Aircraft engines, Speed regulators), Variable-pitch propellers, Propellers (Aerial), Flight speed, Engine fuel systems components, Automatic, Power, Control systems.

Four systems which vary engine power as airplane speed changes were studied. Three of the systems use a variable pitch propeller with manual control and a governor which maintains constant rpm by controlling throttle position. With the variable pitch propeller set at a fixed pitch, the power required to maintain constant rpm varies as air speed changes, thus the governor automatically changes power as air speed varies. The fourth system uses a conventional constant speed propeller and an air speed sensor system controls the engine throttle. All four systems, when compared to the conventional constant speed propeller - manual throttle system, will automatically limit speed build up in a dive. The systems automatically reduce power when air speed increases, thus much steeper dive angle and rate of descent is automatically allowed for the same forward speed. All four systems can be used for automatic power control in normal flying conditions. (Author)

2. Astronomy, Geophysics and Geography

AD-612 484 Div. 2, 8
CFSTI Prices: HC$3.00 MF$0.75

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
IONOSPHERIC RESEARCH.
Quarterly progress rept. no. 5, 1 Oct-31 Dec 64, by H. D. Webb. 31 Dec 64, 53p
Contract DA36 039AMC03703E, Projs. 3A99 20 001 04, 1C014501B11A, Tasks 1Co14501B11A00, 1C014501B11A00 31
Unclassified report

Descriptors: (*Atmospheric sounding, Radar reflections), (*Ionosphere, Scientific research), Moon, Radar reflectors, Ionospheric propagation, Magneto-optic effect, Electron density, Very high frequency, Medium frequency, Data processing systems.

Object of the research is: (1) To continue the work carried out under contract SC85173 by receiving signals by reflection from the moon and measuring the Faraday Rotation; (2) to use the data to calculate the electron content of the ionosphere above the earth; (3) to study the diurnal, seasonal, and irregular changes in electron content; (4) to correlate irregular changes in electron content with other natural phenomena; and (5) to study the reflecting surface of the moon. (Author)

AD-612 494 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Naval Oceanographic Office, Washington, D. C.
ICE COVER OF THE BLACK SEA,
by B. S. Shustov. Jan 63, 27p Trans-184
TT 64-19194
Unclassified report

Ledyanoi Pokrov Chernogo Morya, trans. of Zemlevedenie (USSR) 1934, v. 36, no. 4, p. 376-395.

Descriptors: (*Black Sea, Ice), (*Ice, Black Sea), Thickness, Life expectancy, Stability, Harbors.

The study discusses the ice cover in various coastal areas of the Black Sea, emphasizing the northwestern sector. The following phases in ice formation are taken into consideration: the appearance of ice, freeze-up, duration of ice period, its stability, ice thickness and forms, breakup, and the disappearance of ice in the spring. The study is based on observations carried out since the middle of the last century. Because the earlier observations have been sporadic and incomplete, and the data are sometimes even questionable, the author has re-evaluated the available information in the light of later systematic observations so as to make the study a reliable source of data concerning the ice thickness, duration and stability, especially in harbors and their immediate areas. To prove the soundness of his reasoning, the author often presents observational data by years, singling out the number of years on which the data are based, the severeness of winter, the maximum, minimum and average values of the data with respect to the duration, thickness and form of ice in various coastal sectors of the Black Sea by ten-day periods, months, and winter seasons in various years. (Author)

AD-612 495 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Naval Oceanographic Office, Washington, D. C.
DATA ON ICE CONDITIONS IN THE SEAS OF THE USSR: SEA OF AZOV AND BLACK SEA.
1964, 64p Rept. no. Trans-174
TT 64-19195
Unclassified report

Svedeniya o Sostoyanii L'dov na Moryakh SSSR, trans. of mono. Gidrologicheskoe Upravlenie SSSR (hydrological Administration of USSR) Leningrad, 1926, v. 1, p. 34; v. 2, p. 36-37; v. 3, p. 44-46; v. 4, p. 47-48; v. 5, p. 46-50; v. 6, p. 55-60; v. 7, p. 38-41; v. 8, p. 37-42.

Descriptors: (*USSR, Oceanographic data), (*Black Sea, Ice), (*Ice, Black Sea), Thickness, Harbors, Lighthouses, Seacoast, Oceanology, Seas.

The ice conditions in the Sea of Azov and the Black Sea for the following winters are discussed and tabulated: 1924/25, 1925/26, 1926/27, 1927/28, 1928/29, 1929/30, 1930/31 and 1931/32. The observations on which the data are based cover the more important coastal points and areas, such as ports, harbors, channels, shallows, capes, lighthouses, and water lanes, including open areas of the seas. The papers list the dates of ice appearance and disappearance, of freeze-ups in the autumn and breakup in the spring, including intermediate freeze-ups and breakups. Also the type if ice, its thickness in cm, and concentration is indicated. The data are based mainly on observations conducted from aboard ships and coastal stations, but in certain cases also aerial observations are used. More detailed information is given about ice conditions during the extremely cold winter of 1928/29 and the subsequent winters. (Author)

AD-612 518 Div. 2

Sydney Univ. (Australia).
THE STELLAR INTERFEROMETER AT NARRABRI OBSERVATORY,
by R. Hanbury Brown. 1964, 7p
Grant AF AFOSR302 63
AFOSR 65-0406
Unclassified report

Pub. in Sky and Telescope (U. S.) v28 n2 p1-7 Aug 1964 (Copies available only to DDC users).

Descriptors: (*Interferometers, Astronomical observatories), (*Astronomical observatories, Australia), Stars, Physical properties, Light transmission, Intensity, Measurement, Reflectors, Phototubes, Photomultipliers, Positioning devices (Machinery), Railroad cars, Astronomy.

Design of the instrument had the limited objective of measuring the angular sizes of all stars brighter than about apparent magnitude +2.5 accessible from the latitude of 30 degrees south. Two large reflectors are mounted on trucks which run on a circular railway track with an inside diameter of 600 feet and a gauge of 18 feet. Each reflector is controlled by a computer that calculates continuously the star's direction. To follow the star in azimuth the trucks move around the track, and to follow it in elevation the reflectors tilt about horizontal axes. In addition, the turntable carrying each reflector permits aiming directly at the star. The separation between the two reflectors can be varied from about 30 to 618 feet, and the trucks move so that this baseline remains at right angles to the star's direction.

AD-612 534 Div. 2, 20

Rochester Univ., New York.
ISOTOPIC COMPOSITION AND ENERGY SPECTRUM

OF LOW-ENERGY HELIUM NUCLEI IN PRIMARY COSMIC RADIATION,
by C. Dahanayake, M. F. Kaplon, and P. J. Lavakare. 13 Apr 64, 20p
Grant AF AFOSR439 63
AFOSR 64-2047

Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v69 n17 p3681-99 Sep 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cosmic rays, Isotopes), (*Helium, Cosmic rays), (*Isotopes, Cosmic rays), (*Astrophysics, Cosmic rays), Chemical analysis, Energy, Balloon, Airborne, Photographic emulsions, Nuclei, Nuclear physics, Interstellar matter, Propagation.

The isotopic composition and the energy spectrum of low-energy helium nuclei were investigated, using a nuclear emulsion stack flown from Fort Churchill, Canada, on August 4, 1962. The proportion of He3 nuclei at the top of the atmosphere was determined to be 18 ± 5% within the kinetic energy interval of 160-370 Mev/nucleon and 24 ± 8% within the rigidity interval 1.1-1.4 bv/c. The differential energy spectrum in the above energy interval was found to have a maximum around 275-300 Mev/nucleon. Assuming that there is no He3 at the cosmic-ray sources, and that the observed abundance reflects the interactions of the primary radiation in its passage through interstellar matter, we conclude that the low-energy primary radiation has traveled a total of 6 ± 2 g/sq cm in this medium. This result is found to be consistent with the values obtained from the low-energy lithium, beryllium, and boron experiment. The implications of these results are examined on the basis of different models used for the propagation of cosmic radiation through interstellar matter. (Author)

AD-612 572 Div. 2

High Altitude Observatory, Boulder, Colo.
INFLUX OF METEOR PARTICLES IN THE UPPER ATMOSPHERE OF THE EARTH AS DETERMINED FROM STRATOSPHERIC CORONAGRAPH OBSERVATIONS,
by G. Newkirk, Jr., and J. A. Eddy. 1961, 13p
Contract Nonr39305

Unclassified report

Pub. in Space Research (Netherlands) v3 p143-54 1962 (Copies available only to DDC users). Proceedings of the International Space Science Symposium (no. 2) held at Washington, D. C., 30 Apr-9 May 62.

Descriptors: (*Meteors, Upper atmosphere), (*Upper atmosphere, Meteors), Particle size, Sky brightness, Solar corona, Spectroscopy, Balloons, Airborne, Optical equipment, Sounding rockets, Experimental data, Correlation techniques, Aerosols.

This paper reports the observations of sky brightness near the sun at altitudes up to 25 km, using balloons. From the observed brightness the particle density is deduced as a function of altitude and divided into a component diffusing up from below and one settling from above. The deduced influx of particles in the size range of 0.1 to 2.8 microns radius is compared with rocket and other observations. (Author)

AD-612 576 Div. 2

California Univ., Berkeley.
THE SPECTRUM OF GAMMA PEGASI BETWEEN 3300 AND 3030 A,
by Erika Bohm-Vitense, Diane M. Pyper, and George Wallerstein. 11 Mar 64, 3p
Grant AF AFOSR171 63
AFOSR 65-0401

Unclassified report

Pub. in Astrophysical Journal (U. S.) v140 n2 p807-09 Aug 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stars, Spectra (visible and ultraviolet)), (*Astrophysics, Stars), Spectroscopy, Chemical analysis, Iron, Beryllium, Titanium, Chromium, Line spectrum.

A 2-A/mm spectrogram of gamma Pegasi (type B2 IV) was obtained with the coude spectrograph of the 120 inch reflector. The plate is properly exposed from about 3300 A to a little below 3050 A. The primary purpose was to search for lines of Fe II to test the suggestion by Underhill (Space science Rev., 1: 749 (1963)) that the fluxes of B stars below lambda 2500 as observed by Stecher and Milligan (Ap. J., 119:113 (1962)) might be strongly influenced by blanketing due to numerous lines of singly ionized atoms. In addition the resonance lines of Be II was searched in order to set an upper limited to the abundance of beryllium.

AD-612 579 Div. 2

Palomar Observatory, Pasadena, Calif.
THE ISOTOPE RATIO C(12)/C(13) IN A COMET,
by Antoni Stawikowski and Jesse L. Greenstein. 8 Jun 64, 15p
Contract AF49 638 1323
AFOSR 65-0396

Unclassified report

Pub. in Astrophysical Journal (U. S.) v140 n3 p1280-91 Oct 1 1964(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Comets, Isotopes), (*Carbon, Isotopes), (*Isotopes, Comets), Line spectrum, Band spectrum, Electron transitions, Excitation, Atomic energy levels, Neutron bombardment.

High-resolution spectra of Comet Ikeya (1963a) show the C(12)C(13)(1,0) band at wavelength 4745 with measurable strength. Its intensity was measured and compared with the intensity of two unresolved-triplet, rotational lines of C(12)C(12)(1,0). The structure of the isotope band was computed to obtain the number of lines forming the observed head. From the theory of the excitation of comet lines by resonance fluorescence, the isotope ratio C(12)/C(13) is derived as 70 ± 15. Solar-absorption features, although included, modify the excitation pattern of the C2 lines only slightly, unlike the CN band which has strongly deficient solar radiation. A feature at wavelength 4752 appears near C(13)C(13)(1,0). Its strength is too great to be compatible with C(12)/C(13) approx. = 70, requiring an unacceptably low value. A discussion as to whether C(12)C(13) can be de-excited by pure rotation, unlike the homonuclear C(12) molecules, leads to no definite conclusion since the dipole moment of C(12)C(13) is unknown. We believe that wavelength 4752 is largely affected by a blend with NH2. Another slight blend, at wavelength 4745, may require a slightly higher isotope ratio C(12)/C(13). The C(12)/C(13) ratio is near that on the earth. Some implications for the early history of the solar system are drawn. If the solar C(12)/C(13) ratio proves indeed to be very high the cometary C(13) could have been produced by neutron irradiation. (Author)

AD-612 583 Div. 2

Lockheed Missiles and Space Co., Palo Alto, Calif.
OBSERVATIONS OF CONTINUOUS SUB-ELF

EMISSIONS IN THE FREQUENCY RANGE 0.2 TO 1.0 CYCLES PER SECOND,
by Lee Tepley and K. D. Amundsen. 27 Jul 64, 6p
Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v70 n1 p2349 Jan 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetohydrodynamics, Atmospherics), (*Ionospheric propagation, Electromagnetic waves), (*Extremely low frequency, Electromagnetic waves), (*Atmospherics, Magnetohydrodynamics), Electronic recording systems, Geophysics.

In this note is studied a number of newly recognized properties of a type of sub-ELF emission recently observed in the frequency range 0.2-1.0 cps. The emission is characterized by a band (or bands) of energy often observed continuously throughout the entire night. Sonagrams of the emission are presented. The figures show two subintervals of a 96-hour period (Aug. 1-4, 1963) during which consecutive sonagrams were prepared from data recorded on slow-speed magnetic tape at the Lockheed Pacific Ocean field stations. A distinction is made between the type of Pc1 emission reported here and another category of Pc1 emissions called hydromagnetic (hm) emissions. It appears that continuous emissions and hm emissions differ in a number of respects. The properties of the two types of signals are compared.

AD-612 593 Div. 2, 9

Johns Hopkins Univ., Baltimore, Md.
RESONANT INTERACTIONS AMONG CAPILLARY-GRAVITY WAVES,
by Lawrence F. McGoldrick. 29 May 64, 27p
Unclassified report

Pub. in Journal of Fluid Mechanics. (Gt. Brit.) v21 pt2 p305-31 1965 (Copies available only to DDC users).

Descriptors: (*Ocean waves, Resonance), (*Resonance, Ocean waves), (*Gravity, Ocean waves), Fluid dynamic properties, Surface tension, Frequency, Viscosity, Attenuation, Geophysics, Series, Mathematical analysis.

The analysis is a second-order analysis of the resonant interactions among triads of waves with wavelengths in the capillary-gravity and pure capillary ranges. The analysis is not a power series perturbation analysis, and one of the objects is the removal of the secularity which arises through power series perturbations. It is further found that the interactions are energy-conserving to the order considered here. Suitable modifications are made to accommodate the inevitable viscous attenuation associated with these small wavelengths. A start is made toward describing more completely the various spectra of random seas in wave-number and frequency regions where these interactions are dynamically significant. (Author)

AD-612 608 Div. 2, 26, 30
CFSTI Prices: HC$3.00 MF$0.75

Kaysam Corp. of America, Paterson, N. J.
PRODUCTION ENGINEERING MEASURE FOR MANUFACTURE OF METEOROLOGICAL BALLOONS TYPE ML-541( )/UM.
Final rept. for 19 Apr 62-31 Jan 65,
by Murray Miner. 31 Jan 65, 98p
Contract DA36 039SC85988
Unclassified report

See also AD-608 513.

Descriptors: (*Meteorological balloons, Manufacturing methods), Production, Specifications, Quality control, Machines, Driers (Apparatus).

The first section of the report contains a complete description of the technical and operational problems and their solutions. A thorough investigation of existing hand techniques was performed, and a conical ring method for joining the head and tail balloons was selected as a basis for the design of the assembly machine. Various types of dipping machines were examined. A one cylinder hydraulically operated turntable was chosen for its simplicity, dependability and safety of operation. A conveyorized inflation drying system was designed and installed to inflate and dry head and tail balloons. The second section contains a complete process specification for the manufacture of the ML-541( )/UM meteorological balloon. It fully describes the manufacturing equipment, dipping forms, necessary materials and procedures required to fulfill the pilot un and pilot production line. The third section of the report consists of the Quality Control Manual listing the inspection positions and the yields expected from each process. (Author)

AD-612 623 Div. 2, 32
CFSTI Prices: HC$1.00 MF$0.50

Woods Hole Oceanographic Institution, Mass.
BIBLIOGRAPHY OF REPORTS. 1964,
comp. by Jeanne M. Backus. Jan 65, 13p
Ref-64-54
Unclassified report

Descriptors: (*Bibliographies, Oceanology), (*Oceanology, Bibliographies), Reports, Oceanographic data, Oceanographic equipment, Indexes.

A chronological index of oceanographic research carried out by the Woods Hole Oceanographic Institution is presented. An author index is also included.

AD-612 650 Div. 2, 12
CFSTI Prices: HC$2.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
DIRECT SATELLITE PROBE MEASUREMENTS OF IONOSPHERIC IRREGULARITIES IN THE F REGION AND THE POLAR CAP.
Environmental research papers,
by J. C. Ulwick, W. Pfister, and R. E. McInerney.
Dec 64, 26p AFCRL 64-1021, ERP-74
Proj. 7663
Unclassified report

Descriptors: (*Atmospheric sounding, Scientific satellites), (*Ionosphere, Electron density), (*Scientific satellites, Atmospheric sounding), Probes (Electromagnetic), Dipole antennas, Electrical impedance, Polar orbit trajectories, Ionospheric disturbances, Magnetic recording systems, Meteorology.

A standing wave impedance probe has been flown on polar orbiting satellites through the F sub 2 layer. Continuous measurements for entire orbits were recorded and stored on magnetic tape. The data were processed and plotted completely automatically from the telemetry magnetic tapes. In studying the profiles through the F region, interesting irregularities were found superimposed on the gross features of the ionosphere. Irregularities of a size in the order of 400 kilometers were noted with the small scale density fluctuations between 5 and 10 percent. There is a tendency of these irregularities to be larger in the vicinity of the magnetic equator. Of special interest are irregular structure observed in the south polar region above the peak of the F layer. The satellite passes through the region at the same local time but

covers the whole region geographically in the course of a day. One system of irregularities appears to be aligned with the magnetic latitude, while another structure appears consistently at a geographic latitude near 70 degrees. (Author)

AD-612 651 Div. 2, 9
CFSTI Prices: HC$3.00 MF$0.75

Air Force Cambridge Research Labs., Bedord, Mass.
CORRELATIONS OF TEMPERATURE, PRESSURE, AND DENSITY, TO 30 KILOMETERS.
Air force surveys in geophysics,
by A. E. Cole and P. F. Nee. Jan 65, 85p
AFCRL 65-43, AFSG-160
Proj. 8624

Unclassified report

Descriptors: (*Meteorological parameters, Correlation techniques), (*Atmospheric sounding, Meteorological parameters), Radiosondes, Periodic variations, Meteorology, Climatology, Atmosphere entry, Aerospace craft, Graphics, Tables.

Arrays of means and standard deviations of temperature and density for 2-km intervals of altitude up to 30 km, together with inter- and intra-level coefficients of correlation of density with density, temperature with temperature, and temperature with density, are presented for midseason months at four locations. Temperature and density at the same level are, in general, negatively correlated at altitudes below 30 km. A level of minimum seasonal and latitudinal temperature variability occurs between 12 and 14 km. Seasonal temperature variability is largest near the earth's surface, and the latitudinal variability is greatest between 14 and 17 km. Density variability is least near 8 km, the isopycnic level. A level of maximum seasonal and latitudinal density variability occurs between 12 and 14 km. Means and standard deviations of surface pressure and coefficients of correlation between surface pressure and temperatures at levels up to 30 km are presented and discussed. An examination of the relationship between the standard deviation of surface pressure and the coefficients of variation of density at the level of maximum variability indicates that the variation of surface pressure is not a good index of variations in the vertical density distribution. (Author)

AD-612 681 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge.
REACTIONS OF THE GENERAL CIRCULATION TO SUDDEN SOLAR DISTURBANCE.
Final rept. for Mar 61-Feb 64,
by Hurd C. Willett and John T. Prohaska.
Apr 64, 60p
Contract AF19 604 7996, Proj. 8628, Task 862806
AFCRL 65-22

Unclassified report

Descriptors: (*Solar disturbances, Atmospheric motion), (*Atmospheric motion, Solar disturbances), (*Weather forecasting, Solar disturbances), Meteorological parameters, Climatology, Periodic variations, Correlation techniques.

Results obtained by the investigation of short-term reactions of the general circulation to sudden solar disturbance are summarized as follows: (a) The superposed epoch means of the daily standardized departure patterns of sea-level pressure do not appear to be related to any significant degree to the key day of solar disturbance. (b) There is significant evidence of some suppression of the variability of the daily patterns of sea-level pressure departures on days following the key day of solar disturbance, most notably on days 0 to +4 during the winter half year and on days +6 to +10 during the summer half year. (c) There is significant evidence of some increase of the variability of the daily patterns of sea-level pressure departures at approximately day +14 following the key day of solar disturbance. (d) Correlation evidence supports only to a limited degree results (b) and (c), primarily that of some suppression of the variability of the daily pressure departure patterns on days 0 to +4 during the winter half year. (e) The resemblance of these results to those derived in the study of solar-climatic relationships lies in the fact that more significance attaches to variance relationships than to mean pattern relationships. Significance levels are generally lower for the short-term than for the climatic relationships.

AD-612 708 Div. 2, 25
CFSTI Prices: HC$4.00 MF$0.75

Johannes Gutenberg-Universitat, Mainz (Germany).
RESEARCH ON ATMOSPHERIC OPTICAL RADIATION TRANSMISSION,
by K. Bullrich, E. de Bary, K. Danzer, R. Eiden, K. Heger. Jan 65, 116p Scientific rept. no. SR-3
Contract AF61 052 595
AFCRL 65-109

Unclassified report

Descriptors: (*Atmosphere, Wave transmission), (*Sky brightness, Attenuation), (*Solar radiation, Attenuation), Aerosols, Light, Absorption, Scattering, Optics, Geophysics.

Part I: The influence of absorption on the extinction of solar and sky radiation. Part II: Computations of the spectral radiation distribution emerging from the top of the atmosphere due to molecular and aerosol scattering. Part III: Measurement results of the spectral sky radiation and polarization including spectral intensity distribution of the aureole. (Author)

AD-612 737 Div. 2, 20
CFSTI Prices: HC$4.00 MF$1.00

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THEORETICAL INVESTIGATION OF GEOMAGNETICALLY TRAPPED ELECTRONS FROM HIGH-ALTITUDE NUCLEAR EXPLOSIONS.
Final rept.,
by A. D. Anderson, G. E. Crane, W. E. Francis, L. L. Newkirk, and M. Walt. Jun 64, 137p
Rept. no. 3-24-64-1, LMSC-895355
Contract DA49 146XZ204
DASA 1480

Unclassified report

Descriptors: (*Nuclear explosions, High altitude), (*Electron density, Atmosphere), (*Artificial radioactivity, Explosion effects), Military requirements, Space environmental conditions, Van Allen radiation belt, Nuclear weapons, Detonations, Geophysics.

The report describes the results of a theoretical effort directed toward the identification of the loss mechanisms responsible for the eventual removal of electrons from the trapped population. The principal effort is directed toward the clarification of the role of the atmosphere in removing the electrons.

AD-612 765 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Army Coastal Engineering Research Center, Washington, D. C.

BEACH CHANGES AT VIRGINIA BEACH, VIRGINIA,
by W. Harrison and Kenneth A. Wagner. Nov 64, 28p Miscellaneous paper no. 6-64

Unclassified report

Descriptors: (*Beaches, Erosion), (*Seacoast, Erosion), (*Erosion, Seacoast), Terrain, Configuration, Marine geology, Hydrology, Virginia.

Descriptive summary of results of repeated profiles measured daily, weekly or monthly for 4 transects is presented. The study was not intended to present definitive analysis relating wave action to adjustments in the shore profile but rather serves to show magnitude of profile variations to be expected over a period of years, seasonally, or in one case, for a single violent story. Data are also presented and discussed relating to significance of rhythmic undulations of longshore bar-trough systems as they affect range of cut-and-fill along offshore profiles. (Author)

AD-612 770 Div. 2, 24
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TRANSACTIONS OF CENTRAL SCIENTIFIC AND RESEARCH INSTITUTE OF GEODESY, AERIAL PHOTOGRAPHY, AND CARTOGRAPHY, 1962 VOL. 146 (SELECTED ARTICLES)
24 Feb 65, 45p FTD-MT-64-263
TT 65-61840

Unclassified report

Edited machine trans. of Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros"emki i Kartografii. Trudy (USSR) 1962, v. 146, p. 17-26, 93-103, 121-132.

Descriptors: (*Aerial photography, Instrumentation), (*Photogrammetry, Instrumentation), Radio altimeters, Stereoscopic map plotters, Geodesics, Photographic equipment, USSR.

Contents:
Improved model of RVTD radio altimeter
Accuracy of determination of heights of photographing by readings of radio altimeter RVTD and its modernized model
Scaling devices in stereophotogrammetric instruments of a converted sheaf
Estimation of accuracy of statoscope readings
Experimental work on high-altitude photogrammetric condensing and use of points of photogrammetric condensing during work on STD.

AD-612 771 Div. 2, 8, 25
CFSTI Prices: HC$3.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
AMPLIFICATION OF HYDROMAGNETIC WAVES IN THE MAGNETOSPHERE BY A CYCLOTRON INSTABILITY PROCESS WITH APPLICATIONS TO THE THEORY OF HYDROMAGNETIC WHISTLERS,
by J. A. Jacobs and T. Watanabe. Jan 65, 76p
Rept. no. D1-82-0398
Contract Nonr311600

Unclassified report

Prepared in cooperation with Institute of Earth Sciences, Univ. of British Columbia.
Also available from the author.

Descriptors: (*Magnetohydrodynamics, Upper atmosphere), (*Upper atmosphere, Magnetohydrodynamics), (*Cyclotron waves, Magnetohydrodynamics), (*Whistlers, Magnetohydrodynamics), Polarization, Electromagnetic waves, Charged particles, Resonance, Velocity, Geophysics.

Cyclotron instability is an instability process caused by resonance between a circularly polarized electromagnetic wave and a stream of charged particles. In this paper, cyclotron instabilities which take place in magnetospheric hydromagnetic waves coupled with a stream of either electrons or protons are investigated. The physical nature of the instabilities is examined based upon the general theory of growing waves given by Sturrock, who showed that there are two kinds of instabilities, convective and nonconvective. The growth time of an instability is computed for a typical example representing an actual situation in the magnetosphere. It can be of the order of ten seconds, if ions are resonponsible for the instability in an ion resonance mode of hydromagnetic waves. An attempt is made to apply the theory to hydromagnetic whistlers, where some kind of amplification process seems to take place fairly often.

AD-612 791 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Woods Hole Oceanographic Institution, Mass.
LIST OF WHOI REFERENCE NUMBERS WITH CORRESPONDING DDC NUMBERS 1949-1964,
by Elizabeth D. Orr. Feb 65, 15p Ref-65-7

Unclassified report

Descriptors: (*Oceanology, Bibliographies), (*Bibliographies, Oceanology), Reports, Documentation.

AD-612 814 Div. 2

Air Force Cambridge Research Labs., Bedford, Mass.
A CASE STUDY USING OZONE TO DETERMINE STRUCTURE AND AIR MOTIONS AT THE TROPAPAUSE.
Scientific rept.,
by Samuel Penn. 6 Apr 64, 16p
Environmental research papers no. ERP-80, AFCRL-65-46
Proj. 8631, Task 863102

Unclassified report

Pub. in Journal of Applied Meteorology (U. S.) v3 n5 p581-86 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atmospheric sounding, Tropopause), (*Tropopause, Meteorological parameters), (*Ozone, Tropopause), Aircraft, Instrumentation, Atmospheric motion, Meteorological charts, Meteorology.

Data from an instrumented U-2 aircraft, an ozonesonde and standard radiosondes provided detailed meteorological and ozone data on 2 October 1963 in the vicinity of the tropopause over a stretch of several hundred miles. These observations are used to describe the small-scale structure and motions of the tropopause in a region removed from the jet stream. The tropopause surface appeared to have a wave-like structure which was identifiable over a 2-hr period as the wave moved with the winds at the tropopause level. Furthermore, descending motion of 1.5 cm per sec was computed on the stratospheric side of the more inclined portion of the tropopause, while on the tropospheric side the air maintained constant height. (Author)

AD-612 815 Div. 2

Air Force Cambridge Research Labs., Bedford, Mass.
EVOLUTION OF A GRAPHICAL PREDICTION

TECHNIQUE INCORPORATING AGEOSTROPHIC EFFECTS.
Revised ed.,
by H. Stuart Muench. 10 Jul 64, 14p
Environmental research paper no. ERP-77, AFCRL-65-42
Unclassified report

Pub. in Journal of Applied Meteorology (U. S.) v3 n5 p547-53 Oct 1964 (Copies not available to DDC or Clearinghouse customers)
Revision of rept. dated 9 Apr 64.

Descriptors: (*Air mass analysis, Meteorological charts), (*Meteorological charts, Air mass analysis), (*Weather forecasting, Mathematical prediction), (*Graphics, Air mass analysis), Meteorological parameters, Mathematical models.

Experience with a surface prognostic technique developed by Reed revealed some systematic defects, which were corrected subjectively in practice. In hopes of eliminating the defects, a forecast equation is derived here in a manner slightly different than the derivation of Reed, but which may still be used in a simple forecast scheme. This new equation is applied to a three-day period during January 1964, with fairly successful results. However, an ageostrophic correction, computed from thickness advection patterns, had to be applied to obtain a reasonable position forecast for a cold front in advance of a strong polar outbreak. (Author)

AD-612 816 Div. 2, 12, 30

Utah Univ., Salt Lake City.
EXPERIENCES WITH THE IMPEDANCE PROBE ON SATELLITES.
Scientific rept., Revised ed.,
by O. C. Haycock, K. D. Baker, and J. C. Ulwick.
28 May 64, 12p
Contract AF19 628 447, Projs. 7663, 5710, Task 766307
AFCRL 65-47; AFCRL IP-55
Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (U. S.) v52 n9 p1029-33 Sep 1964 (Copies not available to DDC or Clearinghouse customers).
Revision of report dated 23 Mar 1964.

Descriptors: (*Atmospheric sounding, Scientific satellites), (*Probes (Electromagnetic), Scientific satellites), (*Electron density, Ionosphere), Dipole antennas, Electrical impedance, Standing-wave ratios, Telemeter systems, Data processing systems.

A system is presented for measuring the impedance of a dipole antenna on a satellite orbiting in the ionosphere. These impedance variations are used to determine the electron density of the ionosphere. Details of the instrumentation are given. Experimental results from many satellite flights are given in the form of antenna impedance to aid in antenna engineering. Electron density profiles are also presented. The density data show interesting spatial and temporal variations. Discussion is made of the electron density in the vehicle wake. (Author)

AD-612 817 Div. 2, 9

Air Force Cambridge Research Labs., Bedford, Mass.
THE FALL-OFF WITH HEIGHT OF TERRAIN-INDUCED VERTICAL MOTIONS.
Revised ed.,
by Louis Berkofsky. 30 Mar 64, 12p
Environmental research papers no. ERP-79, AFCRL-65-41
Unclassified report

Pub. in Journal of Applied Meteorology (U. S.) v3 n4 p410-14 Aug 1964 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 23 Jan 64.

Descriptors: (*Atmospheric motion, Terrain), Fluid flow, Boundary layer, Thermodynamics, Functions, Barometric pressure, Mathematical models, Meteorology.

It is shown that the vertical motion due to flow over irregular terrain may be calculated from a simple formula in an atmosphere whose static stability is a function of pressure only. Some computations are presented to shown the fall-off with height of this effect, and these results are compared with computations made from the standard differential equation. (Author)

AD-612 818 Div. 2, 8, 12

Air Force Cambridge Research Labs., Bedford, Mass.
MEASUREMENTS OF RADIO STAR AND SATELLITE SCINTILLATIONS AT A SUBAURORAL LATITUDE,
by R. S. Allen, J. Aarons, and H. Whitney. 20 May 64, 18p AFCRL 65-40, ERP-78
Proj. 4643
Unclassified report

Pub. in I E E E Transactions on Military Electronics (U. S.) vMIL8 n3/4 p146-56 Jul-Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atmospheric sounding, Radio waves), (*Atmospheric refraction, Radio waves), (*Radio waves, Atmospheric sounding), Stars, Radio astronomy, Satellites (Artificial), Radio transmission, High frequency, Very high frequency, Ultrahigh frequency, Atmosphere, Electron density, Phase measurement, Angle of arrival, Geophysics.

Observations of two radio stars, Cygnus A and Cassiopeia A, and of two satellites, Cosmos I and Transit 4A, have yielded data on lower and upper atmospheric irregularities. The frequencies studied have included 20 Mc, 40 Mc and 54 Mc for satellite transmissions, and 30 Mc to 3000 Mc for radio star signals. The antennas used have ranged from a dipole to a 150-foot parabola. The irregularities in refractive index in the lower atmosphere produce amplitude fluctuations up to several times average with a fading rate of 3 to 0.5 per minute while ionospheric amplitude fluctuations can increase several decibels, with rates from 1 to 60 per minute. Lower atmosphere scintillation rates increase as the elevation angle increases and generally disappear above 5 degrees of elevation. During intense magnetic storms, the ionospheric scintillation rate is a function of wavelength in the UHF range. Ionospheric scintillations are functions of both magnetic conditions and of the subionospheric latitudes of the irregularities; they are observed at zenith at the geomagnetic latitude of the Sagamore Hill Radio Observatory (54 degrees). Using spaced receivers, heights of single irregularities have ranged from about 100 to 600 km and representative sizes from about 0.1 to 4 km. Irregularities constitute the prime factor affecting the level, phase and angle of arrival of signals propagated through the auroral regions. (Author)

AD-612 822 Div. 2

Scripps Institution of Oceanography, Univ. of California, La Jolla.

SOURCE MECHANISM OF THE TSUNAMI OF MARCH 28, 1964 IN ALASKA,
by William G. Van Dorn. 1964, 26p
Contract Nonr221620, Proj. NR087 151
Unclassified report

Pub. in mono. Conference on Coastal Engineering (9th). Proceedings p166-90 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ocean waves, Earthquakes), (*Earthquakes, Ocean waves), Alaska Gulf, Marine geophysics, Seismology.

The distribution of permanent, vertical crustal dislocations, the times and directions of early water motion in and around the generation area, and the unusual low-frequency character of the tsunami record obtained from Wake Island, all suggest that the tsunami associated with the great Alaskan earthquake of March 28, 1964 was produced by a dipolar movement of the earth's crust, centered along a line running from Hinchinbrook Island (Prince William Sound) southwesterly to the Trinity Islands. The positive pole of this disturbance encompassed most of the shallow shelf bordering the Gulf of Alaska, while the negative pole lay mostly under land. Thus, the early effect was the drainage of water from the shelf into the Gulf, thus generating a long solitary wave, which radiated out over the Pacific with very little dispersion. Preliminary calculations indicate that the initial positive phase of the tsunami contained about 2.3 x 10 to the 21st power ergs of energy, as compared with 2.7 x 10 to the 22nd power ergs computed for the tsunami of March 9, 1957 in the Andreanof Islands. (Author)

AD-612 824 Div. 2

Scripps Institution of Oceanography, Univ. of California, La Jolla.
TOPOGRAPHY AND LITHOLOGY OF THE MENDOCINO RIDGE,
by D. C. Krause, H. W. Menard, and S. M. Smith.
1964, 18p
Contract Nonr221612, Proj. NR083 005
Unclassified report

Pub. in Journal of Marine Research (U. S.) v22 n3 p236-49 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ocean bottom topography, Pacific Ocean), (*Pacific Ocean, Ocean bottom topography), Hydrographic surveying, Hydrographic sonar, Ocean bottom sampling, Petrology, Structural geology, Oceanographic data, Maps.

Twenty-two slope-corrected bathymetric profiles of the Mendocino Ridge between 125 degrees W and 129 degrees W are presented, and the method of their development is discussed. The crest of this Ridge lies at an average depth of 2000 m, falling off to 3200 m on the north and to 4400 m on the south. A short, steep scarp, fresh dredge-haul material lacking manganiferous crusts, and earthquake epicenters suggest recent faulting on the north. Basalt cobbles and pebbles were the principal constituent of six dredge hauls taken on the Ridge; their petrology is described in the Appendix. Very well-rounded pebbles indicate that the crest was once at or above sea level. (Author)

AD-612 825 Div. 2

Scripps Institution of Oceanography, Univ. of California, La Jolla.
THE EQUATIONS OF CONTINUITY FOR SEAWATER AND RIVER WATER IN ESTUARIES,
by Robert S. Arthur. 24 Feb 65, 7p
Contract Nonr221623, Proj. NR083 005
Unclassified report

Pub. in Journal of Marine Research (U. S.) v22 n2 p197-202 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sea water, Fluid dynamic properties), (*Water, Fluid dynamic properties), (*Estuaries, Turbulence), Rivers, Mixtures, Equations, Surfaces.

Conservation equations for a mixture of fluids with two components are reviewed. Equations of continuity for sea (salt) water and for river (fresh) water in a turbulent mixing process in an estuary are developed. One source of error in certain similar equations in the literature is the omission of the turbulent diffusion flux. (Author)

AD-612 826 Div. 2

Scripps Institution of Oceanography, Univ. of California, La Jolla.
WAVE-BASE, MARINE PROFILE OF EQUILIBRIUM, AND WAVE-BUILT TERRACES: DISCUSSION,
by David G. Moore and Joseph R. Curray.
22 Nov 63, 6p
Contract Nonr221623, Proj. NR083 005
Unclassified report

Pub. in Geological Society of America. Bulletin (U. S.) v75 p1267-73 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Marine geology, Sedimentation), (*Sedimentation, Hydrodynamics), (*Hydrodynamics, Sedimentation), Seacoast, Structural geology.

AD-612 830 Div. 2, 12

Defence Research Board, Ottawa (Ontario).
ALOUETTE TOPSIDE SOUNDER SATELLITE: EXPERIMENTS, DATA, AND RESULTS.
Revised ed.,
by John H. Chapman. 3 Sep 64, 4p
Unclassified report

Pub. in Journal of Spacecraft and Rockets (U. S.) v1 n6 p684-6 Nov-Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Scientific satellites, Atmospheric sounding), (*Atmospheric sounding, Scientific satellites), Probes (Electromagnetic), Radio equipment, Radiation measurement systems, Telemeter systems, Extraterrestrial radio waves, Atmospherics, Electron density, Artificial radioactivity, Geophysics.

Alouette carries three novel experiments, a sweep-frequency (0.5 to 11.5 Mc/sec) topside sounder, a receiver (part of the sounder) capable of monitoring cosmic radio noise, and a very-low-frequency (VLF) receiver. A group of six counters for energetic particles makes the fourth experiment. This paper will discuss these four experiments and summarize briefly some results obtained.

AD-612 842 Div. 2, 20

California Inst. of Tech., Pasadena.

THE SURFACE RATIO OF N14 TO C12 DURING HELIUM BURNING,
by Icko Iben, Jr. 18 Aug 64, 4p
Contract Nonr22047, Grant NASA NGR05 002 028
Unclassified report

Pub. in Astrophysical Journal (U. S.) v140 n4 p1631-3 Nov 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stars, Nuclear reactions), (*Helium, Stars), Carbon, Nitrogen, Spectroscopy, Proton reactions, Gamma emission, Positrons.

AD-612 850 Div. 2, 20

California Inst. of Tech., Pasadena.
NUCLEOSYNTHESIS OF HEAVY ELEMENTS BY NEUTRON CAPTURE,
by Philip A. Seeger, William A. Fowler, and Donald D. Clayton. 14 Jul 64, 48p
Unclassified report

Pub. in Astrophysical Journal. Supplement Series (U. S.) v11 n97 p121-66 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Solar systems, Nuclear reactions), (*Nuclear reactions, Solar systems), (*Neutron capture, Solar systems), Synthesis, Meteorites, Neutron cross sections, Neutron flux, Nuclear binding energy, Nuclear energy levels, Beta decay, Nuclear isobars, Distribution, Radioactive decay.

Nucleosynthesis of elements heavier than the iron group by neutron capture on both slow and fast time scales is evaluated. The s-process calculations of Clayton, Fowler, Hull, and Zimmerman (Ann. Phys. 12:331, 1961) were revised to include more recent experimental results on abundances and neutron capture cross-sections. The solar-system s-process abundances indicate a history of neutron exposure distributions characterized by decreasing probability of high integrated flux; an exponential exposure distribution is extracted. Estimates are made of the s-process contribution to each isotopic abundance; a table gives the amounts of elements produced by each process in the solar-system material. The r-process calculations are carried out using a semi-empirical atomic-mass law to determine neutron-binding energies and beta-decay probabilities. The solar-system r-process material has probably been synthesized in two distinct types of environments. (Author)

AD-612 857 Div. 2

Lamont Geological Observatory, Palisades, N. Y.
THE HINDU KUSH EARTHQUAKE OF MARCH 4, 1949 AS RECORDED IN EUROPE,
by I. Lehmann. 20 Jul 64, 11p
Grant AF AFOSR62 303
Unclassified report

Pub. in Seismological Society of America. Bulletin (U. S.) v54 n6 p1915-25 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Earthquakes, Afghanistan), Seismology, Seismic waves, Propagation, Velocity, Seismological stations, Europe, Records.

The European records from distances 36 degrees - 50 degrees of the deep Hindu Kush earthquake of March 4, 1949 were studied. The many clearly recorded deep-focus reflections lend to the records a characteristic appearance which is repeated in many other shocks from the same focal region. The ratios of the amplitudes of these phases vary somewhat from one shock to another. In the shock here considered sP and sPP are exceptionally large at most stations; in the Italian stations they are not so large, while pP is a clear phase. pP is not very well defined at most other stations. Most of the 1949 records were from the old type long-period instruments having their highest magnification for periods from about 5 sec to 12 sec. Present day instruments of quite short or of very long proper period while admirable for many purposes do not record waves in this period range very well and therefore do not produce a satisfactory picture of the forerunners of earthquakes. The difference between the records obtained on different instruments is illustrated. It is shown in examples that the amplitude ratio PP:P may differ strongly at the same epicentral distance and also that pP may vary greatly with azimuth. The deficiency of station readings is noted. Travel times and their residuals are tabulated and travel times plotted versus epicentral distances. (Author)

AD-612 859 Div. 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
ATTENUATION OF SHEAR WAVES IN THE UPPER AND LOWER MANTLE,
by Robert L. Kovach and Don L. Anderson.
29 Jun 64, 10p
Contract AF49 638 1337
Unclassified report

Pub. in Seismological Society of America. Bulletin (U. S.) v54 n6 p1855-64 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismic waves, Attenuation), Seismology, Shear stresses, Earthquakes, Earth, Mechanical properties.

The attenuation of seismic waves is a direct measure of the absorption due to nonelastic processes in the earth. The well known difficulties in obtaining body wave amplitude decrement data have been avoided by studying the spectral ratios of multiple ScS and sScS phases from two deep focus earthquakes recorded at near normal incidence. The average Q, for shear, in the mantle is about 600 for the frequency range 0.015 to 0.07 cps. Assuming that equal radiation occurs upwards and downwards from the source the average Q for the upper 600 km of the mantle is determined to be about 200 and about 2200 for the rest of the mantle. The value for Q at the base of the mantle is at least 5000 for shear waves. (Author)

AD-612 860 Div. 2

Lockheed Missiles and Space Co., Palo Alto, Calif.
LONGITUDINAL VARIATIONS OF HIGH ENERGY ELECTRONS AT LOW ALTITUDES,
by W. L. Imhof and R. V. Smith. 31 Aug 64, 9p
Contracts NAS5 3111, DA49 146XZ205
Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v70 n3 p569-77 Feb 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atmospheric sounding, Electron density), (*Electron density, Atmosphere), Scientific satellites, Polar orbit trajectories, Scintillation counters, Electrons, Atomic energy levels, Pulse height analyzers, Telemetering data, Geophysics.

Measurements were made, from low altitude polar orbiting satellites, of the longitudinal variations of electrons observed on low L shells, L < or = 1.7. Data were taken in late 1962 with shielded plastic scintillators having effective electron threshold energies of 1.2, 2.4, and 5.0 Mev, and in late 1963 with a plastic scintillation spectrometer equipped with a 16-channel pulse height analyzer operating in two energy ranges (0.3 to 2.6 Mev, and 0.3 to 10.0 Mev) and coded in binary form for the digitized telemetry of individual counts. In the energy interval 0.28-0.71 Mev, the fluxes just west of the Brazilian magnetic anomaly, for B and L coordinates which reach below 100 km, are about an order of magnitude greater than those measured just east of the anomaly at comparable values of B and L. For h sub min in the range 0 to 200 km, the energy spectrum of electrons on L shells in the interval 1.2-1.4 is found to soften rapidly with increasing B value. The flux and energy spectrum suggest that many of the electrons observed at B, L points with h sub min < 0 km for L approx. 1.2-1.4 originate from the trapped radiation belt and that an important redistribution process may be single large-angle Coulomb scatterings in the atmosphere. (Author)

AD-612 861 Div. 2

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
REPLY,
by G. Colombo and G. Fiocco. 7 Oct 64, 1p
Grant NsG87 60

Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v70 n3 p746 1 Feb 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge, Contract DA36 039AMC03200.
Reply to Dr. D. Deirmendjian's note on laser detection of atmospheric dust layers.

Descriptors: (*Lasers, Atmospheric sounding), (*Atmospheric sounding, Lasers), Theory, Geophysics, Dust, Atmosphere.

A polemic on the merits of laser techniques used in atmospheric sounding. The polemic is centered around a letter written by Dr. Deirmendjian (Geophysical Research 70:743-745, 1965) on the subject of uncertainty in the interpretation of some results obtained by laser techniques in detecting atmospheric dust layers.

AD-612 865 Div. 2. 20

California Inst. of Tech., Pasadena.
OBSERVATIONAL NEUTRINO ASTRONOMY,
by John N. Bahcall. 1964, 8p
Contract Nonr22047, Grant NASA NGR05 002 028

Unclassified report

Pub. in Science (U. S.) v147 n3654 p115-20 Jan 8 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Neutrinos, Astronomy), (*Astronomy, Neutrinos), Solar radiation, Cosmic rays, Radioactive decay, Hydrogen, Thermonuclear reactions, Sun, Chlorine, Radiation measurement systems.

Experiments to be performed in 1965 involving neutrinos from the sun, from the decay of cosmic-ray secondaries, and from strong radio sources are discussed. The foundations of the theoretical predictions and the significance of the experiments are emphasized. The role of neutrinos in cosmology is also briefly discussed.

AD-612 878 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
SPECTROPHOTOMETRIC OBSERVATIONS OF LUNAR CRATERS,
by N. P. Barabashov and V. I. Ezerskii.
Jan 65, 10p RSIC-361
TT 65-61845

Unclassified report

Trans. of Akademiya Nauk SSSR. Kommissiya po Fizike Planet. Izvestiya, 1961, v. 3, p. 50-55.

Descriptors: (*Astronomy, Moon), (*Moon, Terrain), Spectrophotometers, Spectroscopy, Astronomical data, Astronomical observatories, USSR.

Presented here, are the results of spectrophotometric observations of the crater Alphonse and other craters, carried out by the Kharkov Astronomical Observatory between 1958 and 1959. No anomalies in the reflectances of separate sections of the lunar craters, including the central peak of crater Alphonse were revealed.

AD-612 894 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Technische Hochschule, Karlsruhe (Germany). Meteorologisches Institut.
THE STRUCTURE OF CLOUDS AND RAIN AND THE FORMATION OF PRECIPITATION.
Final technical status rept. for 1 Jun 63-31 May 64,
by M. Diem. Dec 64, 75p
Contract DA91 591EUC2891

Unclassified report

Descriptors: (*Clouds, Raindrops), (*Raindrops, Particle size), Rainfall, Coagulation, Condensation, Evaporation, Atmosphere, Meteorology, Meteorological instruments, Data processing systems.

Simultaneous measurement of cloud elements and precipitation was carried out at Lake Victoria, Kenia Africa, from March 19 to April 13, 1964. 207,000 rain drops were collected and evaluated according to their size. Simultaneous measurements of the rain drops at the ground and in the free atmosphere were also made at a television tower in Stuttgart, Germany. Fourteen series of measurement was made at 150 m above ground and at the ground with a total of 76,600 sorted drops. The values calculated from drop size and number, such as intensity of precipitation (correct only during a calm), water content and radar reflectibility show the corresponding difference between platform and ground.

AD-612 938 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Raven Industries, Inc., Sioux Falls, South Dakota.
TEMPERATURE AND WIND DATA. SKYHOOK CHURCHILL 1964,
by G. W. Fendrich and J. R. Smith. 31 Jan 65, 43p
Rept. no. 2465
Contract Nonr339012

Unclassified report

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Descriptors: (*Atmospheric sounding, Meteorological ballons), (*Wind, Atmospheric sounding), (*Temperature, Atmospheric sounding), Data, Meteorological parameters.

AD-612 972 Div. 2, 12, 20, 25

Defence Research Telecommunications Establishment, Ottawa (Ontario).
EXCITATION OF CYCLOTRON SPIKES IN THE IONOSPHERIC PLASMA,
by G. E. K. Lockwood. 4 Nov 64, 8p
Unclassified report

Pub. in Canadian Journal of Physics v43 p291-7 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Cyclotron resonance phenomena, Ionospheric disturbances), (*Ionosphere, Plasma medium), (*Atmospheric sounding, Satellites (Artificial), Satellite antennas, Terrestrial magnetism, Excitation, Resonance, Canada.

The occurrence of resonances in the ionosphere at frequencies which are harmonics of the gyrofrequency have been detected by the topside-sounder satellite, Alouette I. It has been observed that the occurrence of cyclotron spikes on ionograms is a function of the angle between the antenna and the earth's magnetic field. The number of cyclotron spikes observed is a maximum when the appropriate antenna is parallel to the earth's magnetic field. (Author)

AD-613 012 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Uppsala Univ. (Sweden). Geodetic Inst.
RESEARCH ON METHODS OF DETERMINING LEVEL SURFACES OF THE EARTH'S GRAVITY FIELD.
Final rept. for 1 May 59-30 Apr 64,
by Erik Tengstrom and Andreas Vogel.
30 Apr 64, 67p
Contract AF61 052 226
AFCRL 65-95
Unclassified report

Descriptors: (*Gravity, Earth), (*Geodesics, Gravity), Light transmission, Atmospheric refraction, Deflection, Optical instruments, Geophysics.

Part I deals with the theoretical possibility of determining refraction by measuring the dispersion angle between rays of visible light with different wave-lengths. Part II describes two instruments for measuring such dispersion-angles. Part III deals with another method of determining geoidal deflections, including also geoidal connections over open sea-areas and medium distances. This method, introduced by the author, uses gravity data together with astro-geodetic reflections. Part IV describes an extrapolation method for the upwards continuation of gravity and deflections. Part V introduces the problem of an eventual secular variation of gravity, due to the dynamical properties of the outer core, and has been studied by dr Andreas Vogel. An attempt of using horisontal pendulums for the purpose of detecting such an effect has been started.

AD-613 017 Div. 2, 25
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
DEEP-SEA LIGHT-ATTENUATION MEASUREMENTS WITH A NULL-BALANCE TRANSMISSOMETER,
by Richard S. Hughes and Roswell W. Austin.
Feb 65, 16p NOTS-TP-3748
Task RU22 2E000 216 1R004 03 01
Unclassified report

Prepared in cooperation with Scripps Institution of Oceanography.

Descriptors: (*Light transmission, Underwater), (*Oceans, Optical properties), (*Underwater light, Attenuation), (*Photometers, Oceanographic equipment), Oceanology, Optics, Military requirements.

This report, which discusses an investigation into the volume attenuation coefficient of light in the sea, also describes a newly developed null-balance transmissometer capable of measuring this coefficient of light to a depth of 2,000 meters. Data obtained to a depth of 700 meters are presented. These data cover that portion of the spectrum from 4980A to 5800A.

AD-613 018 Div. 2, 30
CFSTI Prices: HC$6.00 MF$1.50

Little (Arthur D.) Inc., Cambridge, Mass.
STUDIES OF THE CHARACTERISTICS OF PROBABLE LUNAR SURFACE MATERIALS,
ed. by John W. Salisbury and Peter E. Glaser.
Jan 64, 299p
Contract AF19 628 421, Proj. 8602, Task 860202
AFCRL 64-970, AFCRL SR-20
Unclassified report

Descriptors: (*Lunar environment, Simulators), (*Moon, Surface properties), Extraterrestrial topography, Soils, Petrology, Simulation, Vacuum apparatus, Electrostatics, Thermal properties, Spectroscopy, Astronomy.

This report presents the findings of a cooperative effort by scientists of the Lunar Planetary Research Branch of the Air Force Cambridge Research Laboratories and of Arthur D. Little, Inc., on theoretical and experimental studies to determine the nature and most probable physical form of materials on the lunar surface. To accomplish these goals, the following efforts were performed: (1) installation of an ultra-high-vacuum system to simulate the probable lunar environment, (2) selection of material samples to simulate the probable lunar surface, (3) experimentation on and analysis of these materials in a high vacuum, (4) studies of the behavior of clean surfaces in a high vacuum, (5) measurements of electrostatic phenomena in a high vacuum, (6) measurement of thermal properties in a high vacuum, and (7) spectroscopic studies. (Author)

AD-613 035 Div. 2, 1
CFSTI Prices: HC$2.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
CORRELATION BETWEEN CLEAR-AIR TURBULENCE AND ELECTRIC FIELDS,
by J. E. Nanevicz, E. F. Vance, and S. Serebreny.
Feb 65, 33p Scientific rept. no. SR-1
Contract AF19 628 3308, Proj. 6020, 4690
Task 602003
AFCRL 65-112
Unclassified report

Descriptors: (*Atmospheric motion, Electric discharges), (*Electric discharges, Atmospheric motion), Electric fields, Jet transport planes, Electrical corona, Correlation techniques.

The results of a cooperative effort by Stanford Research Institute, United Air Lines, and Air Force Systems Command to determine the correlation between regions of clear-air turbulence and aircraft electrical activity are described. Corona discharges from precipitation static dischargers on DC-8 aircraft were monitored and correlated with clear-air turbulence encounters. A significant

correlation was found to exist between clear-air turbulence encounters and periods of electrical discharge. It is suggested that these electrical discharges may be caused by electric fields in the region of clear-air turbulence, particulate matter in the region that charges the aircraft, or a combination of both. (Author)

AD-613 038 Div. 2, 8
CFSTI Prices: HC$2.00 MF$0.50

Electrical Engineering Research Lab., Univ. of Texas, Austin.
MILLIMETER STUDIES IN RADIO ASTRONOMY.
Final rept. for 1 Jan 63-1 Jan 65,
by Charles W. Tolbert and Archie W. Straiton.
31 Mar 65, 44p Rept. no. EERL-6-62
Contract AF19 628 1679, Proj. 5629, Task 562902
AFCRL 65-82

Unclassified report

Descriptors: (*Extraterrestrial radio waves, Millimeter waves), (*Millimeter waves, Solar radiation), (*Radioastronomy, Millimeter waves), (*Solar radiation, Millimeter waves), Solar eclipses, Galaxies, Antennas, Temperature, Reports, Signal-to-noise ratio.

The investigations of 94 Gc solar emission during the 20 July 1963 solar eclipse were restricted by inclement weather. No systematic limb brightening was observed; radiation approximately 6 seconds after occultation, was observed from the southeastern limb at the position of a prominence. Tau A (35 Gc) and Sgr A (35 Gc) flux densities were 420 ± 60 x 10 to(-)26th power w/sq m /cps and 290 ± 100 x 10 to(-) 26th power w/sq m /cps, respectively. The flux density of Tau A (70 Gc) interpreted from an antenna temperature signal to noise ratio of approximately 2 to 1 was 790 ± 450 x 10 to(-) 26th power w/sq m /cps. Observations of 94Gc of Sgr A, having a calculated antenna temperature standard deviation of 0.2C, revealed no source of radiation at the central position of Sgr A(35Gc). The 35 Gc position of Tau A and Sgr A coincided, within the limits of the measuring accuracy ± 3(s) R.A. and ±1' Dec., with lower frequency source positions. (Author)

AD-613 042 Div. 2, 30
CFSTI Prices: HC$3.00 MF$0.75

Air Force Cambridge Research Labs., Bedford, Mass.
MASS SPECTROMETRY IN THE D-REGION IONOSPHERE, APPARATUS, TECHNIQUES, AND FIRST MEASUREMENTS,
by R. S. Narcisi and A. D. Bailey. Feb 65, 57p
Environmental Research Papers ERP-82, AFCRL-65-81
Proj. 6687, Task 668701

Unclassified report

Descriptors: (*Mass spectroscopy, Ionosphere), (*Ionosphere, Mass spectroscopy), (*Atmospheric sounding, Mass spectroscopy), Spectrum analyzers, Liquefied gases, Pumps, Sounding rockets, Ions, Electron density, Probes (Electromagnetic), Plasma physics, Fluid flow, Geophysics.

A quadrupole mass spectrometer system employing a liquid nitrogen chilled zeolite pump has recently been developed for sampling positive ions at altitudes above 50 kilometers. This system was flown successfully on a Nike-Cajun rocket on 31 October 1963, and has provided the first positive ion composition measurements in the D-region. For simultaneous environmental measurements of ion and electron densities, two spherical electrostatic analyzers were included in the rocket payload. Supplemental information on ionospheric conditions was provided by a ground-based ionosonde. Due to the high sensitivity of the system approximately twenty (20) positive ion peaks were detected in the mass range 10 to 45 amu within the altitude range of 64 to 112 km. The predominant ions detected within the D-region (64 to 82 km) were 18(+), 30(+) and (37±1)(+), with 32(+) rapidly rising above 75 km approaching the abundance of 30(+) at 83 km. At 82.5 km a sharp transition occurred in the spectra, characterized by the rapid disappearance of 18(+) and 37(+) and instantaneous appearance of six (6) new ion peaks. Five (5) of these ion peaks are suggested to be the metallic ions of sodium (23(+)), magnesium (24(+), 25(+), 26(+)) and calcium (40(+)). The metallic ions all exhibited an identical altitude profile, a ten (10) km-wide peak with a maximum at 95 km, a minimum at 105 km, and then continuously increasing until apogee at 112 km.

AD-613 065 Div. 2, 25, 30
CFSTI Prices: HC$1.00 MF$0.50

Center for Atmospheric and Space Physics, Univ. of Maryland, College Park.
OFFSET VOLTAGES OF LANGMUIR PROBES IN THE IONOSPHERE.
Scientific rept. no. 3, Jan-Oct 64,
by Richard T. Bettinger. Oct 64, 21p
Technical rept. no. TR-414
Contract AF19 628 2792, Proj. 7663, Task 766303
AFCRL 65-54

Unclassified report

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See also AD-603 008.

Descriptors: (*Atmospheric sounding, Probes (Electromagnetic)), (*Probes (Electromagnetic), Atmospheric sounding), (*Ionosphere, Probes (Electromagnetic)), Plasma physics, Sounding rockets, Antennas, Electrical properties, Electron density, Geophysics.

Bipolar Langmuir probes display a voltage offset in their volt-ampere characteristics when immersed in the ionospheric plasma. The dependence of the equilibrium potential as a function of probe scale, ambient charge density and high energy tail in the electron energy distribution is examined. It is concluded that the offset arises from geometric considerations and is strongly influenced by all of the above factors. The observed altitude dependence is qualitatively explained in terms of vehicle velocity and precessional motion. (Author)

AD-613 071 Div. 2
CFSTI Prices: HC$6.00 MF$1.50

Northwestern Univ., Evanston, Ill. Technological Inst.
A RHEOLOGIC INVESTIGATION OF THE DYNAMIC RESPONSE SPECTRA OF SOILS. REPORT 3. ENERGY DISSIPATION RESPONSE OF A COHESIVE SOIL,
by Robert L. Kondner and Michael M. K. Ho.
Jun 64, 262p
Contract DA22 079eng316, Task 13 009

Unclassified report

Descriptors: (*Soil mechanics, Dynamics), Soils, Compressive properties, Deformation, Stresses, Strain (Mechanics), Creep, Loading (Mechanics), Vibration, Shock waves, Propagation, Experimental data, Damping, Vibration, Failure (Mechanics), Fatigue (Mechanics), Energy, Storage.

The results of an investigation of the energy storage and energy dissipation properties of a cohesive soil are

presented. Major emphasis is directed at energy dissipation as well as phenomena associated with energy dissipation. Soil response is represented in terms of visco-elastic parameters. Both direct and indirect methods of determining energy dissipations are considered. Damping capacity as a function of frequency is determined directly by measuring the phase angle, delta, between applied and resulting waveforms in uniaxial (unconfined) compression with controlled sinusoidal vibration. The results are given in terms of the loss tangent, tan, delta. The loss tangent is dependent on moisture content, frequency, and amplitude of dynamic stress-strain; but specimen geometry and static stress level, within the range considered seem to have no definite effect on the results. The experimental response is definitely nonlinear. Energy dissipation is also obtained by indirect methods through the application of Fourier transformation techniques to experimental data obtained from creep and stress relaxation tests. The loss tangent relations obtained using the Fourier Transforms are comparable to those obtained by the direct stress-strain-phase angle method.

AD-613 086 Div. 2

Air Force Cambridge Research Labs., Bedford, Mass.
GENERAL CIRCULATION OF THE SOLAR ATMOSPHERE FROM OBSERVATIONAL EVIDENCE,
by Fred Ward. 15 Jan 64, 39p
Environmental Research Papers no. ERP-84, AFCRL-65-115
Proj. 7698, Task 7698 04
Unclassified report

Pub. in Geofisica Pura e Applicata (Italy) v58 n2 p157-86 1964 (Copies available only to DDC users).

Descriptors: (*Solar atmosphere, Motion), (*Astrophysics, Solar atmosphere), Fluid flow, Solar disturbances, Periodic variations, Correlation techniques, Models (Simulations).

Analysis of ten years (1935 to 1944) of Greenwich spot data shows a consistent, and (statistically) very significant correlation of spot group proper motions, in the proper sense. These results provide strong support for the existence of large-scale waves which are some modest fraction of the solar circumference, but larger than the sunspot groups. Moreover, these waves transport angular momentum (up the gradient of angular velocity) toward the equatorial regions from higher latitudes across at least the entire sunspot zone. It is not known, however, whether these eddies are the primary (or only) source of momentum to maintain the 'equatorial acceleration' of the sun. However, if this source were shut off, and all other processes continued unabated, this layer of the sun between latitudes ± 20 degrees would reach solid rotation in about 5 1/2 rotations. Because this eddy transport of momentum is counter to the gradient of angular velocity, there is an implied transformation of the kinetic energy of the eddies into the kinetic energy of the mean east-west flow. Of possibly even more interest, however, might be the possibility of transfers of kinetic energy between eddies of all different scale sizes extending down the entire spectrum to include sunspot groups and the spots themselves. Moreover, some eddy size(s) in this layer is likely to be primarily responsible for a conversion of potential to kinetic energy.

AD-613 114 Div. 2

Scripps Institution of Oceanography, Univ. of California, La Jolla.
GEOLOGY OF THE ISLAS REVILLAGIGEDO, MEXICO 4. GEOLOGY AND PETROGRAPHY OF ISLA ROCA PARTIDA,
by Adrian F. Richards. 16 Apr 64, 9p
Contract Nonr221623, Proj. NR083 005
Unclassified report

Pub. in Geological Society of America. Bulletin (U.S.) v75 p1157-64 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Geology, Mexico), (*Mexico, Geology), Petrography, Islands, Marine geology, Geochemistry.

Isla Roca Patrida, located southwest of Baja California, Mexico, is probably a remnant of the volcanic neck of a large composite volcano, the summit of which has been eroded by wave action. A broad insular shelf, with shelf break occurring at about 80 fathoms, indicates wave erosion during a past eustatic sea-level lowering; it also indicates that the volcano is Late Pleistocene or older in age. The island consists of trachyandesite, which is similar in chemical composition to the alkali basalt-sodic rhyolite associations found on the other three Islas Revillagigedo. (Author)

AD-613 116 Div. 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
BODY FORCE EQUIVALENTS FOR SEISMIC DISLOCATIONS,
by R. Burridge and L. Knopoff. 14 Aug 64, 14p
Grant AF AFOSR26 63
Unclassified report

Pub. in Seismological Society of American. Bulletin (U. S.) v54 n6 p1875-88 Dec 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismology, Mechanics), (*Structural geology, Seismology), Earthquakes, Seismic waves, Propagation, Mathematical models.

An explicit expression is derived for the body force to be applied in the absence of a dislocation, which produces radiation identical to that of the dislocation. This equivalent force depends only upon the source and the elastic properties of the medium in the immediate vicinity of the source and not upon the proximity of any reflecting surfaces. The theory is developed for dislocations in an anisotropic inhomogeneous medium; in the examples isotropy is assumed. For displacement dislocation faults, the double couple is an exact equivalent body force. (Author)

AD-613 125 Div. 2, 20

Westinghouse Research Labs., Pittsburgh, Pa.
ATOMIC COLLISION PROCESSES RELATING TO THE IONOSPHERE.
Semi-annual technical summary rept. for 1 Sep 64-28 Feb 65,
by A. V. Phelps, G. G. Schulz, and P. J. Chantry.
17 Mar 65, 11p
Contract Nonr258400, ARPA Order 125 63
Unclassified report

Pub. in Physical Review Letters (U. S.) v13 n15/20 p477-8/583-5 Oct 12 1964/Nov 16 1964 (Copies not available to DDC or Clearinghouse customers)
Rept. on Proj. DEFENDER.

Descriptors: (*Ionosphere, Nuclear reactions), (*Nuclear reactions, Ionosphere), Elastic scattering, Inelastic scattering, Nuclear cross section, Helium, Nitrogen, Carbon dioxide, Ions, Atomic energy levels, Resonance, Mass spectroscopy, Spectrum analyzers.

Electron beam experiments have been performed with the aim of improving our understanding of upper atmosphere collision processes. In particular, nitrogen ionization leading to N4(+) has been studied. Negative

ion formations has been studied in O2, CO and CO2. Attention has been given to a study of resonances and their role in electron transmission through rare gases and atomic hydrogen. (Author)

AD-613 140 Div. 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
FIRST MOTIONS FROM SEISMIC SOURCES NEAR A FREE SURFACE,
by R. Burridge, E. R. Lapwood, and L. Knopoff.
14 Aug 64, 25p
Unclassified report

Pub. in Seismological Society of America. Bulletin (U. S.) v54 n6 p1889-1913 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismology, Structural geology), Seismic waves, Propagation, Configuration, Mathematical models, Geophysics.

The radiation patterns of first motions are calculated for the sudden occurrence of an arbitrarily oriented fault (dislocation) at the surface of a half space; the dislocation in the fault plane is also arbitrarily oriented and is assumed to occur over a very small area of the fault plane. Initially the source is considered at a finite depth and the solution is obtained by allowing the depth to tend to zero. In general the results show a surprising directionality for the radiation of SV. In the focal plane projection the first motions of P and SH for a strike-slip fault show the familiar four-lobed radiation patterns. The first motions of SV show some reversals in polarity with angular distance from the source. The first motions for all components of motion for a dip-slip fault have characteristics governed strongly by the presence of the free surface, and hence differ markedly from the usual radiation patterns for a deeply imbedded source. (Author)

3. Chemical Warfare Equipment and Materials

AD-612 659 Div. 3, 13, 18
CFSTI Prices: HC$4.00 MF$0.75

Litton Systems, Inc., St. Paul, Minn. Applied Science Div.
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
Bimonthly progress rept. no. 8, 1 Sep-31 Oct 64,
by C. Hagberg. 30 Jan 65, 113p Rept. no. 2711
Contract DA18 108AMC214A, Proj. 52405
Unclassified report

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Descriptors: (*Shelters, Chemical warfare), (*Biological warfare, Armed forces research), (*Decontamination, Biological warfare agents), (*Chemical warfare, Armed forces research), Bacterial aerosols, Enviromental tests, Cooling and ventilating equipment, Protective coverings, Structural shells, Wind, Drag, Lift, Purification, Simulation, Military medicine, Power supplies, Control systems.

The report covers two major areas: (1) a program for developing three different types of ECS (Environmental Control System) packages designated as the electrical heating, gas fired heating, and heat pump packages, and (2) a program for developing a suitable pod configuration. This program was undertaken because practical and analytical data are not available to determine which pod design is the most feasible.

AD-612 665 Div. 3
CFSTI Prices: HC$2.00 MF$0.50

Naval Research Lab., Washington, D. C.
FIELD DECONTAMINATION STUDIES WITH CHEMICAL WARFARE DECONTAMINATING SOLUTION DS2.
Interim rept.,
by G. H. Fielding. Dec 64, 27p Rept. no. NRL-6191
Proj. SF 011 08 09 1726
Unclassified report

Descriptors: (*Chemical warfare agents, Decontamination), (*Ships, Decontamination), (*Decontamination, Effectiveness), Mustard agents, Paints, Adsorption, Environmental tests, Corrosion, Cleaning compounds, Vaporization, Decontamination kits.

The standard U. S. Army chemical warfare decontaminant DS2 was studied for shipboard applicability. Single and multiple treatments of DS2 and DANC were compared with water-washdown plus aeration in effectiveness against mustard gas absorbed in Navy paint. Residual mustard gas in paint was evaluated via the vapor source strength, as determined by the NRL Vaporator and the M15 CW Agent Detector kit. When all treatments were preceded by thorough washdown, single treatments with DS2 or DANC were two to four times as effective as simple aeration. Multiple applications of DS2 were of very limited value. (Author)

AD-613 006 Div. 3, 1, 29
CFSTI Prices: HC$1.00 MF$0.50

Tactical Air Command, Langley AFB, Va.
OPERATIONAL TEST AND EVALUATION AERIAL SIGNAL FLARE.
Mar 65, 25p TAC-TR-64-621
Unclassified report

Descriptors: (*Flares, Performance (Engineering)), (*Packaging, Flares), Tactical Air Command, Packaging, Survival kits, Foils, Burning rate, Aviation personnel, Flight clothing, Operation, Visual signals, Aluminum.

This test was conducted to determine the suitability of packaging, and operational acceptability of the EX 79 MOD O Signal Kit. Tests were also conducted to determine the operational capability of the signal flare and define deficiencies in the present configuration. The packaging method for the flare kit is considered unsuitable. The Kraft aluminum foil overwrap wears through after little use and has more bulk than necessary. Some minor deficiencies were revealed in the pengun which will be easily corrected. The pengun flare kit has extremely high aircrew acceptability and a high percentage preferred to carry the kit in the flight clothing. The cartridges furnished in the kit demonstrated high reliability as not a single failure was recorded out of the hundreds fired during the test. The average burning time for the flares was 3.64 seconds; the average altitude as determined by phototheodolite was 275.4 feet. (Author)

4. Chemistry

AD-612 474 Div. 4, 3, 16
CFSTI Prices: HC$1.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
SYNTHESIS OF 7-METHYL-2-OXO-2,4,5,6-TETRAHYDROPYRROLO (1,2-c) PYRIMIDINE.
Technical rept. for Sep 60-Jun 61,
by Rar R. Irino. Nov 64, 15p Rept. no. CRDLR-3238
Task 1C522301A06007

Unclassified report

The work was performed in conjunction with Contract DA18 108CML5998.

Descriptors: (*Mussel poisons, Molecular structure), (*Pyrroles, Synthesis (Chemistry)), (*Pyrimidines, Synthesis (Chemistry)), N-heterocyclic compounds, Esters, Decomposition, Spectra (Visible and ultraviolet), Spectra (Infrared), Nuclear magnetic resonance.

As part of a study for the elucidation of the structure of saxitoxin, the synthesis was undertaken of a possible C8 fragment resulting from the degradation of the natural product. The preparation of 7-methyl-2-oxo-2,4,5,6-tetrahydropyrrolo (1,2-c)-pyrimidine, a new ring system, is described. The selective oxidation to the desired 7-methyl-2-oxo-2,4,5,6-tetrahydropyrrolo-(1,2-c) pyrimidine was accomplished with a dilute neutral aqueous solution of potassium permanganate at room temperature overnight. The physical and analytical properties of 7-methyl-2-oxo-2,4,5,6-tetrahydropyrrolo-(1,2-c) pyrimidine were not identical with those of the product obtained from the natural product. The 8-methyl derivative is the correct structure of one of the degradation products of saxitoxin. (Author)

AD-612 475 Div. 4, 25
CFSTI Prices: HC$3.00 MF$0.75

Mallinckrodt Chemical Labs., Harvard Univ., Cambridge, Mass.
ROTATIONAL ISOMERISM AND MICROWAVE SPECTROSCOPY. III. THE MICROWAVE SPECTRUM OF 3-FLUOROPROPENE,
by Eizi Hirota. 1964, 64p
Contract Nonr186614

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-284 171.

Descriptors: (*Halogenated hydrocarbons, Microwave spectrum), (*Microwave spectroscopy, Halogenated hydrocarbons), (*Molecular isomerism, Halogenated hydrocarbons), Alkenes, Fluorides, Molecular rotation, Stereochemistry, Band spectrum, Atomic energy levels, Chemical bonds, Labelled substances, Dipole moments, Stability, Thermochemistry.

The 3-fluoropropene molecule has been confirmed by microwave spectroscopy to exist in two rotational isomers, cis and gauche. Rotational constants in the ground vibrational state were determined. Rotational transitions are also assigned for isotopic species, eight of the cis and nine of the gauche form. By using Costain's method the molecular structure was determined separately for the two isomers. The dipole moment and its components along the principal axes of inertia were also found. Through the temperature dependence of the intensity ratio the cis form is found more stable than the gauche form by 166 ± 67 cal/mole. The energies of the first and the second excited states of the C-C torsion were determined by the relative intensity measurement. Some of the spectra in the excited states of the gauche form are doublets due to the tunnel effect through the trans barrier. Using these data a potential function for the rotation around the C-C single bond is drawn. A correlation is pointed out between the potential function and the binding states of carbon atoms forming the rotation axis. (Author)

AD-612 483 Div. 4, 25
CFSTI Prices: HC$2.00 MF$0.50

American Meteorological Society, Boston, Mass.
THE CURRENT STATUS AND PROBLEMS OF THE CALCULATION OF ELECTRON SHELLS IN MOLECULES,
by N. D. Sokolov. Nov 64, 41p Rept. no. T-R-459
Contract AF19 628 3880
TT 65-61832

Unclassified report

Sostoyanie i Zadachi Rascheta Elektronnykh Obolochek Molekul, trans. of Lietuvos Fizikos Rinkinys (Lithuanian SSR) 1963, v. 3, no. 1/2, p. 205-226.

Descriptors: (*Molecular structure, Mathematical analysis), (*Electron transitions, Molecular structure), Chemical bonds, Computer programming, Atomic orbitals, Correlation techniques, Ground state, Excitation, Field theory, Quantum mechanics, USSR.

In this review of the present status of quantitative molecular calculations with computers, as well as semi-quantitative and semi-empirical calculations of molecules, it is concluded that the main theoretical challenge in the development of quantitative calculations is to work out effective methods for including electron correlations. Such methods have been developed recently for atoms and for molecules without conjugated bonds, but have been applied to individual cases only and are entirely lacking for molecules with conjugated bonds. Evidently relevant theory should be developed along the lines of field quantum-theoretical methods and of various models. The second part of the paper is a review of semi-quantitative mathematical treatments of molecular and radical energies in ground and excited states, studies of molecular geometry, and calculations of weak interactions. (Author)

AD-612 486 Div. 4, 25
CFSTI Prices: HC$2.00 MF$0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
SPIN-ECHO NMR STUDIES OF CHEMICAL EXCHANGE. IV. INTRAMOLECULAR EXCHANGE OF A COUPLED AB SYSTEM,
by Adam Allerhand and H. S. Gutowsky. 14 Feb 65, 37p Technical rept. no. TR-81
Contract Nonr183413, Proj. NR051 215

Unclassified report

See also AD-602 927.

Descriptors: (*Exchange reactions, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Exchange reactions), (*Halogenated hydrocarbons, Exchange reactions), Fluorides, Cyclohexanes, Reaction kinetics, Molecular isomerism, Absorption spectrum, Nuclear spins.

A mathematical and experimental study of the spin echo amplitudes in a Carr-Purcell train of echoes is reported for a coupled AB system undergoing intramolecular exchange. The density matrix approach was used to derive a set of four coupled recursion relations for the amplitudes of successive echoes. A program was

written to investigate the properties of the system numerically with a high speed computer. Predictions were verified by F(19) spin echo experiments at 16.70 and 25.27 Mc/sec on 1,1-difluorocyclohexane in which axial and equatorial fluorines are interchanged by the chair-chair isomerization.

AD-612 497 Div. 4, 7
CFSTI Prices: HC$1.00 MF$0.50

American Meteorological Society, Boston, Mass.
OXIDATION OF HYDROGEN ON A POROUS NICKEL ELECTRODE,
by O. S. Ksenzhek and E. A. Kalinovskii.
Nov 64, 11p Rept. no. T-R-457
Contract AF19 628 3880
TT 65-61833
Unclassified report

Okislenie Vodoroda na Poristom Nikelevom Elektrode, trans. of Zhurnal Prikladnoi Khimii (USSR) 1964, v. 37, no. 6, p. 1256-1260.

Descriptors: (*Hydrogen, Oxidation), (*Electrodes, Porous materials), (*Nickel, Electrodes), (*Powder metals, Electrodes), Effectiveness, Sintering, Surface properties, Polarization, Batteries and components, USSR.

Elevation of the sintering point of powder nickel electrodes reduces the activity of their surface (diffusion current); oxidation and subsequent reduction loosens and activates the surface of the nickel. The macroscopic polarization characteristics of porous electrodes are determined both by their kinetic and their structural properties. The electrodes studied were compared with each other and with a smooth nickel electrode and it was found that the best of the porous electrodes was 1000 times more active than the smooth nickel electode. (Author)

AD-612 498 Div. 4, 25
CFSTI Prices: HC$3.00 MF$0.75

Westinghouse Electric Corp., Baltimore, Md.
Surface Div.
INVESTIGATION OF GAS IONIZATION PHENOMENON AT OPTICAL AND IR FREQUENCIES.
Interim progress rept. no. 2, Aug-Dec 64,
by L. C. VanAllen, R. Wynant, A. D. Phelps, D. P. Gaver, and J. A. Marshall. Feb 65, 88p
Contract AF30 602 3332, Proj. 5561, Task 556106
RADC TR-64-568
Unclassified report

Also see AD-610 590.

Descriptors: (*Lasers, Gas ionization), (*Gas ionization, Photochemistry), (*Photochemistry, Gas ionization), (*Light, Gas ionization), (*Infrared radiation, Gas ionization), Reaction kinetics, Ruby, Plasma medium, Argon, Helium, Air, Photon, Electron transitions, Microwaves, Absorption, Theory, Mathematical analysis.

The status of the work on ruby laser induced gas ionization is reported. Experimental measurements of the focused spot diameter, breakdown emission, ionization times and nonattenuation ionization are presented. The theoretical study results obtained to date in the areas of nonlinear ionization initiation and the extension of the microwave breakdown theory are discussed. (Author)

AD-612 550 Div. 4, 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CLASSICAL GROUND STATE SPIN CONFIGURATIONS IN THE CORUNDUM LATTICE,
by N. Menyuk and K. Dwight. 29 Oct 63, 5p
Unclassified report

Pub. in Physics and Chemistry of Solids (U. S.) v25 p1031-4 1964 (Copies available only to DDC users).

Descriptors: (*Corundum, Crystal structure), (*Ground state, Spin), (*Magnetic properties, Corundum), Crystal lattices, Hamiltonian, Ions, Neutron diffraction analysis.

By means of the Luttinger-Tisza method, it is proven that a simple coplanar spiral always constitutes the classical ground state of the Heisenberg exchange Hamiltonian in magnetic corundum-type structures (i.e. Cr2O3 and alpha -Fe2O3). This proof is shown to independent of the values of the various exchange interactions. It therefore follows that the treatment of mixed systems in terms of averaged interactions cannot yield any other result. This conclusion is discussed in connection with the conical spirals observed by Cox, Takei and Shirane in the system Fe2xCr2-2xO3.

AD-612 560 Div. 4

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Chemistry.
SEPARATION OF HYDROCARBON LIQUIDS BY FLOW UNDER PRESSURE THROUGH POROUS MEMBRANES,
by S. Sourirajan. 1964, 6p Rept. no. NRC-8186
Unclassified report

Pub. in Nature (Gt. Brit.) v203 n4952 p1348-49 Sep 26 1964 (Copies available only to DDC users).

Descriptors: (*Hydrocarbons, Separation), (*Membranes, Liquid filters), Porous materials, Cellulose acetate, Polyethylene plastics, Films, Sorption, Pressure vessels, Canada, Mixtures.

Three different types of porous films were used in the experiments. Two types of cellulose acetate and one type of polyethylene were used. The feed solution systems tested were xylene-ethyl alcohol, xylene-n-heptane, and n-heptane-ethyl alcohol. The operating cell consists of a stainless steel pressure chamber of two detachable parts. The film is mounted on a stainless steel porous plate embedded in the lower part of the cell through which the membrane permeated liquid leaves the syste at atmospheric pressure. The upper part of the cell contains the feed solution under pressure in contact with the membrane. The separation technique was successful in all the cases tested.

AD-612 573 Div. 4, 25

California Univ., La Jolla.
APPROXIMATE BAND ABSORPTION AND TOTAL EMISSIVITY CALCULATIONS FOR CO2,
by S. S. Penner and P. Varanasi. 6 Jul 64, 9p
Contract Nonr221600, Proj. NR015 401
Unclassified re

Pub. in Journal of Quantitative Spectroscopy and Radiative Transfer (Gt. Brit.) v4 p799-806 1964 (Copies available only to DDC users).

Descriptors: (*Carbon dioxide, Molecular spectroscopy), (*Molecular spectroscopy, Carbon dioxide), Band spectrum, Emissivity, Continuous spectrum, Harmonic oscillators, Electric moments, Absorption spectrum, Selection rules.

A highly simplified procedure, using symmetrical band contours and intensity estimates derived from harmonic

oscillator approximations, was used to calculate band and total emissivities for CO2. Agreement with experimental data and with more accurate calculations is excellent. (Author)

AD-612 580 Div. 4

California Univ., Los Angeles. Dept. of Chemistry.
THE APOISOBORNYL BRIDGED ION. BOROHYDRIDE REDUCTION OF APOCAMPHOR,
by Robert Howe, Edwin C. Friedrich, and S. Winstein. 26 Oct 64, 4p
Grant DA AROD31 124G642
AROD 3580: 13

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v87 n2 p379-81 Jan 20 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Terpenes, Ketones), Borohydrides, Reduction, Molecular structure, Molecular isomerism, Stereochemistry, Ions.

All the evidence in solvolysis points to a preferred bridged or nonclassical structure for such ions as norbornyl or apoisobornyl. The present evidence points up again that strained bicyclo (2.2.1)-heptyl systems are more disposed toward nonclassical structures than are their open-chain analogs.

AD-612 586 Div. 4, 25

Pennsylvania Univ., Philadelphia.
A SEMI-EMPIRICAL MO THEORY OF SIGMA ELECTRON SYSTEMS. III. THE BOND ADDITIVITY RULE,
by Hidekazu Hamano. 10 Mar 64, 6p
Grant DA AROD31 124G172
AROD 3090:23

Unclassified report

Pub. in Chemical Society of Japan. Bulletin v37 n11 p1592-7 1964 (Copies available only to DDC users). Also supported by a grant from NSF.

Descriptors: (*Chemical bonds, Field theory), (*Molecular structure, Field theory), Atomic orbitals, Electrons, Atomic energy levels, Heat of formation, Dipole moments.

The additivity rules for bond energies and bond moments are discussed on the basis of a previously-proposed theory (see AD-612 582). The results show that the apparent additivities are partially caused by accidental cancellations when summing over the molecule and essentially by the invariance of the trace of the matrix representing the molecular quantity. Bond energies are then constant in different molecules, whereas bond moments are not, mainly because of the inductive effect. (Author)

AD-612 587 Div. 4, 25

Pennsylvania Univ., Philadelphia.
A SEMI-EMPIRICAL MO THEORY OF SIGMA ELECTRON SYSTEMS. II. BOND POLARITY AND ELECTRONEGATIVITY,
by Hidekazu Hamano. 10 Mar 64, 9p
Grant DA AROD31 124G172
AROD 3090:22

Unclassified report

Pub. in Chemical Society of Japan. Bulletin v37 n11 p1583-91 1964 (Copies available only to DDC users).

Descriptors: (*Chemical bonds, Field theory), (*Molecular structure, Field theory), (*Halogenated hydrocarbons, Chemical bonds), Atomic orbitals, Electrons, Atomic energy levels, Perturbation theory, Ions, Polarization, Dipole moments, Nuclear moments.

A previously proposed theory (see AD-612 588) is applied to a study of the electronegativity scale and the ionic character of bonds. The general validity of the electronegativity scale and also the relation between the Mulliken and Pauling scales are discussed. The previously defined inductive effect is used as a basis for calculations on MXn-type molecules and on n-alkyl halide molecule. The results are then used for the qualitative interpretation of the experimental dipole moments, nuclear quadrupole coupling constants and fluorine chemical shifts. (Author)

AD-612 588 Div. 4, 25

Pennsylvania Univ., Philadelphia.
A SEMI-EMPIRICAL MO THEORY OF SIGMA ELECTRON SYSTEMS. I. GENERAL THEORY,
by Hidekazu Hamano. 10 Mar 64, 10p
Grant DA AROD31 124G172
AROD 3090:7

Unclassified report

Pub. in Chemical Society of Japan. Bulletin v37 n11 p1547-83 1964 (Copies available only to DDC users).

Descriptors: (*Chemical bonds, Field theory), (*Molecular structure, Field theory), Atomic orbitals, Electrons, Atomic energy levels, Perturbation theory, Resonance, Complex compounds.

A semi-empirical Molecular Orbital (MO) theory is proposed for complex saturated molecules. In a first-order treatment, each MO is represented as a localized function that contains only the Atomic Orbital connected with one bond or atom. This enables us to define a set of bonding, anti-bonding and lone-pair orbitals. The molecular wave function is obtained as an anti-symmetrized product of the bonding and lone-pair orbitals. In this approximate theory the definitions of the electronegativity scale and of the inductive effect are discussed; the electronegativity scales proposed by Moffitt and Mulliken are obtained as special cases. In a subsequent, more accurate second-order theory each MO is represented as a linear combination of all bonding, anti-bonding and lone-pair orbitals; this treatment is made by means of the perturbation theory. A semi-empirical approach is developed by taking the interactions between different bonds as empirical parameters. (Author)

AD-612 605 Div. 4, 10
CFSTI Prices: HC$2.00 MF$0.50

Space General Corp., El Monte, Calif.
B9H15 AND B8H12; SYNTHESIS, EQUILIBRIA AND DECOMPOSITION KINETICS,
by Robert E. Williams, John Spielman, and J. F. Ditter. 15 Mar 65, 32p Technical rept. no. TR-6
Contract Nonr438100, Proj. NR356 461

Unclassified report

Descriptors: (*Borohydrides, Chemical properties), Boranes, Synthesis (Chemistry), Chemical equilibrium, Pyrolysis, Reaction kinetics, Stereochemistry, Mass spectrum, Molecular structure.

The prevalence of hydrogen tautomerism and skeletal rearrangements in the boron hydrides suggests that either the elimination or accretion of neutral BH3 groups should take place with ease; hence, it would be expected that boron hydrides observed under rigorous conditions

should, in most cases, not differ by any number of BH3 groups. A pursuant experimental investigation of this hypothesis resulted in the synthesis of B8H12 (from B9H15), a high yield synthesis of B9H15 and evidence that some of the published data purported to reveal the existence of B6H12-14 and B7H15-17 have been misinterpreted. A rationale of the complexities in the pyrolysis of the boron hydrides is presented. (Author)

AD-612 607 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Pennsalt Chemicals Corp., Philadelphia, Pa.
HIGH PRESSURE SYNTHESIS OF NEW SILICON SULFIDES,
by M. S. Silverman and J. R. Soulen. Feb 65, 9p
Technical rept. no. TR-44
Contract Nonr268700, Proj. NR356 408
Unclassified report

Descriptors: (*Silicon compounds, Sulfides), Synthesis (Chemistry), High-pressure research, Glass, Crystals, Silicon, Sulfur, Heating, X-ray diffraction analysis.

By heating mixtures of silicon and sulfur in various atomic ratios to temperatures of 700-2300 degrees C at pressures of 25-80 kilobars (kb), a variety of reaction products has been obtained. In addition to the previously known SiS2 and SiS, these include several colored glasses and three new crystalline materials with distinctive X-ray diffraction patterns.

AD-612 630 Div. 4, 25
CFSTI Prices: HC$1.00 MF$0.50

Rutgers State Univ., New Brunswick.
SPIN-LATTICE RELAXATION IN CESIUM-CHROME ALUM.
Technical rept.,
by Robert D. Turoff. 1 Jan 65, 12p
Contract Nonr40408
Unclassified report

Descriptors: (*Relaxation time, Electron transitions), (*Chromium, Ions), (*Paramagnetic resonance, Chromium), Cryogenics, X band, Molecular spectroscopy, Spin, Crystal lattices, Temperature, Cesium, Chromium compounds, Ammonium compounds, Sulfates.

The spin-lattice relaxation times of three lines of the electron paramagnetic resonance spectrum at 9.6 kMc/sec of the Cr(3+) ion in cesium chrome alum have been measured as a function of temperature between 1.6 K and 4.2 K and dilution between 0 and 36 (non-magnetic to magnetic ions) by the steady-state saturation method. The three lines were those at the lowest field (line 1), the second lowest field (line 2), and the highest field (line 3). The rates of relaxation increase with dilution for lines 1 and 2, and decrease with dilution for line 3. The dilution dependence for line 3 can be qualitatively explained by cross-relaxation, but the dilution dependences for lines 1 and 2 elude explanation. The relaxation rate of each resonance line shows at least two temperature dependences at each dilution. They are interpreted as arising from a combination of cross-relaxation and direct processes between 1.6 K and 3.0 K, and indirect processes between 3.0 K and 4.2 K. (Author)

AD-612 662 Div. 4, 7, 25
CFSTI Prices: HC$1.00 MF$0.50

Coates Chemical Labs., Louisiana State Univ., Baton Rouge.
ELECTRODE KINETICS AT OPEN CIRCUIT AT THE STREAMING MERCURY ELECTRODE I. THEORY,
by Paul Delahay. Jan 65, 17p
Technical rept. no. TR-55
Contract Nonr157504, Proj. NR051 258
Unclassified report

Descriptors: (*Electrodes, Dynamics), (*Mercury, Electrodes), Electrolytes, Thermodynamics, Voltage, Equations, Electrical double layer, Transport properties, Theory.

A general equation is derived for the potential, at open circuit, of an electrode of varying area at which a charge transfer process occurs. Application is made to the streaming mercury electrode for which there is continuous renewal of the double layer. The steady-state overvoltage is derived for mixed control by charge transfer and mass transfer for any value of the overvoltage. Simplified equations are given for small overvoltages (< or = 5 millivolts). Limiting cases are also analyzed. Application to electrode kinetics in media of low conductivity is considered, and two expected difficulties are indicated. (Author)

AD-612 669 Div. 4

California Univ., Los Angeles. Dept. of Chemistry.
THE APOISOBORNYL-exo-CAMPHENILYL NON-CLASSICAL CATION,
by A. Colter, Edwin C. Friedrich, N. J. Holmes, and S. Winstein. 15 Oct 64, 3p
Grant DA AROD31 124G642
AROD 3580:14
Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v87 p378 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Terpenes, Stereochemistry), Sulfonates, Ions, Decomposition, Reaction kinetics, Molecular isomerism.

Results are reported of studies of the dimethyl-labeled norbornyl systems, the apoisobornyl (apoiso) (I) and exo-camphenilyl (exo-cam) p-bromobenzenesulfonates, related by a Wagner-Meerwein rearrangement, and the isomeric B-fenchoisocamphoryl (B-fenchoiso) analog III-OBs, together with the corresponding endo epimers. These systems provide considerable insight into carbonium ion structure and 6,2-hydrogen shift. Kinetics of acetolysis are first order for the various systems except in the case of I-OBs. In this case, there is a disturbance from ion-pair return. The rates of acetolysis of the exo derivatives are substantially higher than those of their endo epimers, the exo/endo titrimetric rate ratios being quite substantial. The data suggest that anchimeric acceleration of ionization of the exo epimers to bridged or nonclassical dimethyl-substituted norbornyl cations is substantial in all three systems and at least similar in magnitude to that for exo-norbornyl. Product studies also indicate strongly that the apoiso- and exo-cam-OBs isomers react by way of common bridged or nonclassical species, thus yielding identical mixtures of exo solvolysis products. Evidence strongly suggests a sequential relationship between 6,1- or 6,2-hydrogen shift and 1,2-carbon bridging rather than a competitive one. (Extracted)

AD-612 670 Div. 4

California Univ., Los Angeles. Dept. of Chemistry.
REACTION OF THE TRITYL CATION WITH DIMETHYLKETENE DIMETHYLACETAL,

by Richard Heck, Phillip S. Magee, and S. Winstein.
8 Jun 64, 5p
Grant DA AROD31 124G642
AROD 3580:12

Unclassified report

Pub. in Tetrahedron Letters (U. S.) n30 p2033-6 1964
(Copies available only to DDC users).

Descriptors: (*Ketenes, Chemical reactions), (*Acetals, Chemical reactions), (*Polycyclic compounds, Chemical reactions), Bromides, Esters, Synthesis (Chemistry), Ions, Molecular structure.

The reaction of trityl bromide with dimethylketene dimethylacetal yields a quinoidal ester derivative, resulting from reaction of the trityl cation at a para position. Treatment of this ester with methanolic sodium methoxide converts it to an aromatized isomer. The formation of the quinoidal ester makes it clear that the trityl ion reacts at a para position with dimethylketene acetal as a relatively highly hindered nucleophile to give a quinoidal cation which then leads to the quinoidal ester. The results emphasize the possibility of reactions of the trityl cation with nucleophiles at a benzene ring position, giving rise to new final products or possible transient intermediates with the nucleophile at a ring position instead of the central carbon atom. (Extracted)

AD-612 691 Div. 4, 30
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center,
Redstone Arsenal, Ala.
INORGANIC THIN-LAYER CHROMATOGRAPHY RESEARCH. PT. 2. TOTAL ANALYSIS OF METALLIC IONS BY THIN-LAYER CHROMATOGRAPHY,
by Shoji Takitani. Feb 65, 8p RSIC-371
TT 65-61838

Unclassified report

Trans. of Bunseki Kagaku (Japan) 1964, v. 13, no. 5, p. 469-471.

Descriptors: (*Metals, Chromatographic analysis), (*Chromatographic analysis, Metals), (*Ions, Metals), Ammonium compounds, Thiols, Paper.

An investigation was made on the effect on cation detection in the usual systematic qualitative analysis of cations, in the presence of possibly interfering anions such as borate, phosphate, sulphate, arsenate, oxalate, and tartrate. There is no interference with most of the metal ions. With respect to the metal ions, a specific quantity was made into a spot by means of a micrometer. Then after spreading, the identification limits of various detection methods were determined. When the same identification methods are compared in paper chromatography, in general, thin-layer chromatography is more sensitive, the ions which are 10 - 100 times more sensitive predominating. Finally, reliability of ion identification methods was considered and a cation analytical method combining the previous methods of systematic analysis with the present method was investigated. After the major separation of cations into families using NH4SH, qualitative identification of each ion by means of thin-layer chromatography was accomplished. The time required, compared to qualitative analysis only, was shortened, positive identification of ions was made, and the method is thought to be useful in qualitative analysis of cations.

AD-612 747 Div. 4

University of Southern California, Los Angeles.
PHOTOCHEMICALLY-INDUCED REACTIONS OF SULPHENYL CHLORIDES,
by Norman Kharasch and Z. S. Ariyan. 7 Apr 64, 3p
Contract DA31 124ARO D68
AROD 4040:1

Unclassified report

Pub. in Chemistry and Industry (Gt. Brit.) p929-30 1964 (Copies available only to DDC users).

Descriptors: (*Organic sulfur compounds, Photochemistry), (*Photochemistry, Organic sulfur compounds), Aromatic compounds, Halogenated hydrocarbons, Catalysis, Free radicals.

The ease with which pentachlorobenzene sulfenyl chloride (I) undergoes a series of photochemically-induced reactions is demonstrated. In ordinary, diffuse sunlight, but not in the dark, (I) undergoes complete reaction with excess of cyclohexane, yielding hydrogen chloride, cyclohexyl chloride, cyclohexyl pentachlorophenyl sulphide, m.p. 116C and bis(pentachlorophenyl) disulphide, m.p. 235-236C. A chain-radical process is proposed for this reaction. Compound (I) also undergoes a light-catalysed reaction with toluene, only the side chain being affected in the absence of Friedel-Crafts catalysts. Other light-induced reactions of (I) which illustrate its high reactivity, are its facile additions to diphenylacetylene and to deactivated olefins, and its light-induced decomposition in carbon tetrachloride solution to form bis(pentachlorophenyl) disulphide. Another new reaction is that between (II) and p-benzoquinone. This reaction also requires illumination and leads to several products, including quinhydrone, 2-pentachlorophenylsulphenyl-1:4-vebenzoquinone m.p. 177C), and substitution products thereof, including a disulphenylated benzoquinone, decomp. >300C, and a chloro-derivative, m.p. 219-220C. (Extracted)

AD-612 780 Div. 4, 14, 25
CFSTI Prices: HC$1.00 MF$0.50

Brussels Univ. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURES. PART XXVI. MASS SPECTROMETRIC STUDY OF THE VAPORIZATION OF LEAD MONOXIDE. THE DISSOCIATION ENERGY OF PbO,
by J. Drowart, R. Colin, and G. Exsteen. Dec 64, 26p
Contracts AF61 052 764, AF61 052 225, Proj. 7350, Task 735001
WADD TR-60-782 P26

Unclassified report

See also AD-611 365.

Descriptors: (*Vaporization, Thermodynamics), (*Lead compounds, Monoxides), (*Monoxides, Dissociation), (*Mass spectroscopy, Lead compounds), Vapor pressure, High-temperature research, Polymers, Enthalpy, Chemical equilibrium, Belgium.

The composition of the vapor in equilibrium with lead oxide (yellow rhombic form) in the temperature interval 1000-1150K was determined mass spectrometrically. The predominant species are PbO, Pb2O2, Pb3O3 and Pb4O4. From the partial PbO pressure measured here and that based on a reinterpretation of the literature data, when taking the presence of the polymers into account, the dissociation energy of the molecule PbO= 88.4±1.4 kcal/mole. The standard enthalpy at 25C of the reactions, Pb2O2(g) 2 PbO(g), Pb3O3(g) 3PbO(g), Pb4O4(g) 4 PbO(g), is 63.4±4, 126.4±6.0 and 202.0±10.0 kcal/mole respectively. (Author)

AD-612 800 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Temple Univ., Philadelphia, Pa. School of Pharmacy.
THE INVESTIGATION OF THE SYNTHESIS AND CHEMISTRY OF ORGANIC INTERMEDIATES.
Summary rept. for 1 Sep 63-30 Sep 64,
by Samuel Elkin. 30 Sep 64, 21p
Rept. no. R-29
Contract DA18 108Cm16622

Unclassified report

Descriptors: (*Alcohols, Synthesis (Chemistry)), (*Carboxylic acids, Synthesis (Chemistry)), (*Esters, Synthesis (Chemistry)), Organic nitrogen compounds, Resorcinol, N-heterocylic compounds, Piperidines, Cyclopentanes, Cyclohexanes, Ketones, Organic compounds, Chemistry.

Contents:
Methods of preparation of 5-nitroresorcinol
3-Quinuclidinol from 4-piperidinylethylene glycol
Methods of preparation of cyclopentylphenylglycolic acid
Preparation of (-)-ethyl 5-methylcyclohexanone-2-carboxylate

AD-612 820 Div. 4, 25

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
THEORY OF RYDBERG SERIES IN POLYATOMIC MOLECULES: H2O,
by S. R. La Paglia. 16 Mar 64, 9p
Rept. no. ARL 65-34

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n5 p1427-31 Sep 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Water, Electron transitions), (*Polyatomic molecules, Electron transitions), (*Electron transitions, Theory), Atomic orbitals, Perturbation theory, Atomic energy levels, Absorption spectrum, Field theory.

The characteristic features of the Rydberg transitions in a polyatomic molecule are examined with emphasis on their extravalence-shell nature. It is made plausible that in molecular orbital perturbation theory the corresponding Hartree-Fock atomic orbital of principal quantum number n is a zero-order approximation to the Rydberg orbital. Calculations without integral approximations are carried out for the lowlying states of H2O. The ASP-SCF-LCAO-MO treatment of the H2O ground state provides the core. The mean singlet-triplet absorption spectrum of H2O is fairly well reproduced by the calculation. (Author)

AD-612 823 Div. 4, 13

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
THE REACTION OF CHLORINE DIOXIDE WITH TRIETHYLAMINE IN AQUEOUS SOLUTION.
by David H. Rosatt, Albert J. Hayes, Jr., Bernice L. Harrison, Richard A. Streaty, and Kenneth A. Moore. 2 Jan 63, 11p CRDL SP-3-19
Task 1C622401A09501

Unclassified report

Pub. in Journal of Organic Chemistry (U. S.) v28 p2790-4 Oct 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Chlorine compounds, Dioxides), (*Amines, Oxidation), (*Water supplies, Impurities), Aldehydes, Hydrogen, Chlorites, Oxidizers, Reaction kinetics, pH.

The work was done to understand more fully the reactions of chlorine dioxide with organic amine contaminants in water. As a model tertiary amine, triethylamine was chosen. Chlorine dioxide oxidizes the alpha-carbon of the amine and then cleaves the carbon-nitrogen bond, which is similar to other reactions between oxidants and tertiary amines. The principal reaction products are: acetaldehyde, diethylamine, chlorite ion, and hydrogen ion. The ions were produced nearly quantitatively in excess of the amine. When chlorine dioxide was in excess, it reacted with triethylamine in the ratio 2:1. The amine reacts only as a free base, as shown by the dependence of reaction kinetics on pH. The reaction is first order with respect to each reactant. The second-order rate constant, calculated with respect to concentrations of amine free base and chlorine dioxide, is approximately 200,000/M/sec at ambient temperature. There were no effects caused by changes in buffer concentration. Experiments were also performed with diethylamine, which reacted more slowly than triethylamine under comparable conditions. (Author)

AD-612 879 Div. 4, 25
CFSTI Prices: HC$2.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
DETERMINATION OF THE STRUCTURE OF ORGANIC COMPOUNDS BY MEANS OF CHROMATOGRAPHY. FUNCTION RM AS THE BASIS OF STRUCTURAL ANALYSIS BASED ON CHROMATOGRAPHY,
by Zelimir Prochazka. 1965, 49p RSIC-309
TT 65-61846

Unclassified report

Trans. of Chemicke Listy (Czechoslovakia) 1964, v. 58, p. 911-945.

Descriptors: (*Organic compounds, Molecular structure), (*Chromatographic analysis, Molecular structure), (*Molecular structure, Organic compounds), Theory, Mathematical analysis, Czechoslovakia.

AD-612 958 Div. 4
CFSTI Prices: HC$4.00 MF$0.75

Oklahoma State Univ., Stillwater. Research Foundation.
MOLECULAR FLOW AND THE EFFUSION PROCESS IN THE MEASUREMENT OF VAPOR PRESSURES. PART II. ADDITIONAL DATA AND DETAILS OF EQUIPMENT.
Annual rept. for 1 Jun 63-31 Aug 64,
by Robert D. Freeman. Jan 65, 110p
Contract AF33 657 8767, Proj. 7360, Task 736004
ASD TDR-63-754 P2

Unclassified report

See also AD-424 180.

Descriptors: (*Vapor pressure, Measurement), (*Superaerodynamics, Orifices), Diffusion, Molecular beams, Molecular weight, Vapors, Balances, Furnaces, Cooling, Silver, Gold, Tin, Calcium compounds, Fluorides, Analysis.

Details are given for molecular beam apparatus for the measurement of the angular distribution of molecules effusing from non-ideal orifices. The vacuum microbalance

and furnace which are used in the microbalance-inverted Knudsen effusion-recoil (Miker) technique for determining vapor pressures and molecular weights are described in detail. Miker results are given for the vapor pressure of silver, gold, and calcium fluoride. Some data on the diffusion of silver and gold vapors through graphite cell walls resulted as a by-product of these studies. Values obtained for the molecular weights of tin and calcium fluoride vapors are somewhat ambiguous, but do indicate that improvements in the technique are still possible and necessary. An analysis of the rate of effusion from a cooling Knudsen effusion cell is given. The complete details of an analysis and computation of transmission probabilities, angular distribution functions, and recoil force corrections for conical and cylindrical orifices are now available. (Author)

AD-612 961 Div. 4, 25
CFSTI Prices: HC$1.00 MF$0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
SPECTROPHOTOMETRIC STUDY OF COBALT CHLORIDE COMPLEXES IN MELTS,
by I. V. Tananaev and B. F. Dzhurinskii. 1965, 8p
Rept. no. T-1780-65
TT 65-61849

Unclassified report

Spektrofotometricheskoe Izuchenie Khloridnykh Kompleksov Kobal'ta v Rasplavakh, trans. of Akademiya Nauk SSSR. Doklady, 1960, v. 134, no. 6, p. 1374-1377.

Descriptors: (*Complex compounds, Cobalt compounds), (*Cobalt compounds, Chlorides), (*Absorption spectrum, Cobalt compounds), (*Chlorides, Cobalt compounds), Eutectics, Spectrophotometers, Test methods, Laboratory equipment, Solvents, Lithium compounds, Potassium compounds, Nitrates, USSR, Pase studies.

The report is devoted to a study of chloride complexes of Co(++) in an LiNO3 - KNO3 melt of an approximately eutectic composition.

AD-613 013 Div. 4, 14
CFSTI Prices: HC$2.00 MF$0.50

Monsanto Research Corp., Everett, Mass.
CHEMILUMINESCENT SYSTEMS.
Technical rept. no. 3, 1 Dec 64-28 Feb 65,
by Abraham W. Berger. 22 Mar 65, 28p
MRB3009Q3
Contract Nonr451100, Proj. NR356 464; ARPA order 299

Unclassified report

See also AD-609 609.

Descriptors: (*Luminescence, Organic materials), (*Organic materials, Luminescence), (*Photochemistry, Luminescence), Oxidation, Indoles, Organic solvents, Photometers, Ketones, Emissivity, Fluorescence.

The survey of chemiluminescent autoxidation reactions has been continued. Of the forty odd additional compounds screened, the large majority show enhanced chemiluminescence over background in potassium t-butoxide dissolved in dimethylsulfoxide (DMSO). About one-third of the reactants exceeded 1% of the standard source brightness. The latter group includes several substituted benzoins, demonstrating the generality of the chemiluminescence of the oxidation of this class of stable radicals. The chemiluminescence of indole and several 3-substituted indoles has been investigated. In t-Bu OK and DMSO solution, 0.005 M skatole is about fifty times brighter than the standard source. At a base concentration of 0.067 M the brightness is an increasing function of skatole concentration to almost 0.1 mole/liter. At this concentration the brightness is 400 times that of the standard, or about half that of 0.005 M luminol. Emission and fluorescence spectra (uncorrected) have been obtained for the basic skatole solution and for the addition, 0.0001 M fluorescein. (Author)

AD-613 040 Div. 4, 30

IIT Research Inst., Chicago, Ill.
SURVEY OF THE THERMOCHEMISTRY OF HIGH-ENERGY REACTIONS.
Rept. for 15 Apr 62-14 Aug 63,
by Elliott Raisen, Sidney Katz, and Karl D. Franson.
Aug 63, 216p Technical rept. no. IITRI-C191-33
Contract AF33 616 7835, Projs. 4030, C191,
Task 403003
ASD TDR-63-846

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Thermochemistry, Reviews), (*Metals, Thermochemistry), (*Oxidizers, Thermochemistry), Chemical reactions, Thermal radiation, Pyrotechnics, Programming (Computers), Enthalpy, Oxides, Fluorides, Chlorides, Sulfides, Phosphides, Azides, Nitrides, Silicides, Carbides, Nitrates, Nitrites, Chlorates, Perchlorates, Chromates, Borides, Chemical equilibrium, Heat of reaction, Data.

The report describes the thermodynamic and computational phases of a survey of exothermic chemical reactions. Computer programs were prepared and enthalpies were obtained for all inorganic reactions for which data were adequate. Tabulations included reactions of metals with oxides, fluorides, chlorides, sulfides, phosphides, azides, nitrides, silicides, carbides, nitrates, nitrites, chlorates, perchlorates, chromates, and borides. Data for a total of about 20,000 reactions were obtained. The data for the individual reactions included a balanced chemical equation, and enthalpies and heats of reaction per unit weight and volume. Supplementary tabulations included listings in order of energies of the most energetic reactions in each class, graphical presentations of the reactions of all the metals with various oxidizing agents plotted against enthalpies, similiar plots for the reactions of all the oxidants in different classes with various metals, and a total recapitulation of all the reactions in each category in grid form in descending order of energy per unit weight and per unit volume. (Author)

AD-613 076 Div. 4, 22, 25
CFSTI Prices: HC$6.00 MF$1.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PROCEEDINGS OF THE BASIC RESEARCH GROUP CONTRACTORS' CONFERENCE AND SYMPOSIUM (12th), U. S. ARMY ENGINEER RESEARCH AND DEVELOPMENT LABORATORIES, FORT BELVOIR, VIRGINIA, 6-8 NOVEMBER 1963,
by M. D. Kemp. 1963, 279p
Proj. 8X99 25 001 41

Unclassified report

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Descriptors: (*Army research, Azides), (*Azides, Symposia), Reports, Synthesis'(Chemistry), Chemical properties, Physical properties, Sodium compounds, Barium compounds, Lithium compounds, Magnesium compounds, Aluminum compounds, Complex compounds, Purification, Lead compounds, Crystal growth, Impurities, Crystals, Decomposition, Potassium compounds, Organic nitrogen compounds, Alkaline earth compounds, Reaction kinetics, Crystal structure, Paramagnetic resonance, Nuclear magnetic resonance, Absorption spectrum, Explosives initiators, Statistical analysis, Impact shock, Spectra (Infrared), Molecular spectroscopy, Excitation.

AD-613 093 Div. 4, 10, 22

Miami Univ., Coral Gables, Fla.
THE INDUCTION PERIOD OF THE CHLORIDE-CATALYZED DECOMPOSITION OF AMMONIUM NITRATE,
by C. I. Colvin, P. W. Fearnow, and A. G. Keenan.
15 Mar 65, 7p Special rept. SR-3
Contract Nonr4008 07

Unclassified report

Pub. in Inorganic Chemistry (U. S.) v4 p173-6 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Explosive materials, Pyrolysis), (*Ammonium compounds, Nitrates), (*Pyrolysis, Catalysis), (*Catalysis, Reaction kinetics), Decomposition, Catalysts, Chlorides, pH, Propellants.

A novel procedure of flushing with inert gas at reaction temperature to establish a zero time enables accurate measurements of induction periods to be made in ammonium nitrate melts containing chloride. The resulting data together with pH measurements are interpreted to indicate that the mechanism of the induction period consists of an acid-autocatalyzed adjustment of the melt acidity from one steady-state level to another. The data also support the mechanism previously published for the chloride-catalyzed thermal decomposition of ammonium nitrate. (Author)

AD-613 150 Div. 4, 25

Institute for Molecular Physics, Univ. of Maryland, College Park.
SCATTERING OF HIGH-VELOCITY NEUTRAL PARTICLES. XIII. Ar-CH4; A TEST OF THE PERIPHERAL-FORCE APPROXIMATION,
by E. A. Mason and I. Amdur. 13 Jul 64, 4p
Grant NsG5 59

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n9 p2695-7 Nov 1 1964 (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Polyatomic molecules, Molecular association), (*Physical chemistry, Polyatomic molecules), (*Molecular association, Polyatomic molecules), Atoms, Particle beams, Nuclear scattering, Argon, Methane, Chemical bonds, Nuclear cross sections, Potential theory.

Collision cross sections were measured for argon atoms with energies between 700 and 2100 eV, scattered in room-temperature methane. The results were analyzed to obtain the average potential between an argon atom and a methane molecule, V(gamma)) sub Av = 936/gamma to 7.85 power eV, 2.31 A< or = gamma < or = 2.66 A. This result has been used as a test of combination-rule approximations by comparing it with the average potential calculated from previous measurements on He-CH4, He-He, and Ar-Ar. The peripheral-force approximation gives consistent relations among the experimental results for these systems. (Author)

5. Communications

AD-612 634 Div. 5, 8
CFSTI Prices: HC$3.00 MF$0.50

General Atronics Corp., Philadelphia, Pa.
S-3000X PROTOTYPE HF DIGITAL DATA MODEM.
Final rept. Dec 64, 51p Rept. no. 1367-2004-10
Contract AF19 629 3281
ESD TDR-64-679

Unclassified report

Descriptors: (*Radio communication systems, High frequency), (*Voice communication systems, Digital systems), (*Data transmission systems, Digital systems), Simulation, Transmitter-receivers, Command and control systems, Design, Performance tests, Reliability (Electronics), Analysis.

The S-3000X Prototype HF Digital Data Modem is a breadboard test model which provides a simulation of 3000 b/s data transmission on a high frequency radio voice circuit while actually transmitting 1200 b/s or 750 b/s. A provision has been made for redundant transmission at lower rates for comparison purposes. This final report covers the system specification, critical subsystem and component specifications, laboratory evaluation, a performance analysis and a reliability analysis of the S-3000 modem. (Author)

AD-612 939 Div. 5, 18, 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
A DYNAMIC COMPUTER MODEL FOR SIMULATING MILITARY COMMAND SYSTEMS.
Professional paper,
by Leland F. Page. 16 Nov 64, 16p
Rept. no. SP-1866/000/00
Contract SD97

Unclassified report

Descriptors: (*Command and control systems, Armed forces operations), (*Game theory, Armed forces operations), (*Armed forces operations, Game theory), Dynamics, Real time, Digital computers, Models (Simulations), Military tactics, Weapon systems, Networks.

This paper describes a computer-based, war-gaming model that operates under a time-sharing system on a large scale digital computer. The model simulates a command system comprised of a command post and a network of subordinate weapon control centers, weapon launch platforms, weapons, sensors, and their interconnecting communication links. Its major purpose is to serve as a general simulation tool that can be readily adapted to simulate a variety of command systems and conflict situations. As such, it can aid in the evaluation of performance and effectiveness of command-control systems, operating as vulnerable networks in dynamic conflict with a reactive enemy.

6. Detection

AD-612 510 Div. 6, 8, 30
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
SIGNAL-SIMULATOR FOR THE NAVY SPACE SURVEILLANCE SYSTEM COMBINERS.
Interim rept.,
by H. B. Gardner. 10 Feb 65, 15p Rept. no. NRL-6243
Proj. RT8801 001 6521S434 00 01

Unclassified report

Descriptors: (*Space surveillance systems, Test equipment (Electronics)), (*Test equipment (Electronics), Simulators), (*Signals, Simulators), (*Simulators, Radio signals), Radio interferometers, Phase control devices, Mixers (Electronic), Naval equipment, Naval research.

In order to test the performance of an interferometer phase-channel combiner the phase of many signals must be varied in a coherent manner. The electro-mechanical signal-simulator used for combiner research is costly and considered too cumbersome for use in field installations. Consequently, using a basic principle of combiner operations, that of translating the incoming phase carriers to frequencies proportional to the antenna spacing, provides an indirect approach to the simulation of signals. Using a single signal source, a dynamic check of any or all channels may be rapidly made. (Author)

AD-612 711 Div. 6, 2, 20
CFSTI Prices: HC$3.00 MF$0.50

Geotechnical Corp., Garland, Tex.
PROJECT DRIBBLE-SALMON EVENT VOLUNTEER TEAM PROGRAM,
by R. A. Weisbrich. 17 Feb 65, 52p
Rept. no. TR-65-17
Contract AF33 657 12145, Proj. VELA T4051

Unclassified report

Descriptors: (*Nuclear explosions, Underground explosions), (*Underground explosions, Seismology), (*Seismology, Underground explosions), Detection, Seismic waves, Scientific personnel, Maps, Records, Recording systems.

The primary purpose of Project DRIBBLE was to test the theory that exploding a charge at the center of a spherical cavity of proper size will muffle the explosion to such an extent that little of its energy will be converted into seismic waves. This is called the 'decoupling theory' and the proposed test program includes three explosions: SALMON, TAR, and SAND. The SALMON event, a coupled 5-kiloton explosion, was to provide data on the fully tamped case and to allow observation of effects of propagation of seismic waves from the salt dome to large distances. The direct decoupling measurements are to be obtained from the detonation of two 100-ton devices, one fully tamped (TAR) and one in a cavity of the appropriate size (SAND). Both of these events still require final approval. Measurements from these two events will allow a direct determination of the decoupling effect and scaling of the data from SALMON and TAR (the fully tamped events) will allow an estimate of the decoupling expected for a 5-kiloton explosion detonated in a cavity.

AD-612 719 Div. 6, 8
CFSTI Prices: HC$2.00 MF$0.50

Rome Air Development Center, Griffiss AFB, N. Y.
STANDARD RESPONSE INDICATOR, SOME INVESTIGATIONS INTO A DEVICE FOR DETERMINING THE MINIMUM VISIBLE SIGNAL OF A RECEIVER,
by Edward F. Hjort and Travis MacClendon, Jr.
Jan 65, 43p Rept. no. RADC TR-64-534
Proj. 921H9101

Unclassified report

Descriptors: (*Signal-to-noise ratio, Radar receivers), (*Radar receivers, Signal-to-noise ratio), (*Measuring devices (Electrical and Electronic), Signal-to-noise ratio), Detection, Radar signals, Noise (Radar), Identification systems, Pulse counters, Display systems, Oscilloscopes, Decision making, Standarization.

The Standard Response Indicator's (SRI) basic function is to establish a threshold level and to provide an output signal whenever the threshold level is exceeded. Threshold detection is based on making a decision of target or no target at a certain level in the output of a receiver. For visual minimum visual signals (MVS), the detection process is complicated by the addition of random noise to the desired signal. The averaging of this random noise by the repetitive sweep of the oscilloscope and the slow response time of the eye tend to increase and distort the average noise level. The increase in apparent noise level must be overcome by the desired signal in order to become visible to the operator. The SRI eliminates the problem of decision making based on an arbitrary reference level set by the operator. The decision of the SRI is based upon the detection of noise pulses exceeding a threshold (voltage level) in a given period of time. This eliminates most of the effects of random high-level noise spikes present in the receiver output. A large number of sample periods averaged over an interval of time remove the random effects of the noise as seen by the SRI, and an absolute indication of the presence or absence of the desired signal is obtained.

AD-612 721 Div. 6, 18, 28
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Test Station, China Lake, Calif.
VISUAL DETECTION OF TARGETS: ANALYSIS AND REVIEW.
Rept. for Jan 62-Jan 63,
by Ronald A. Erickson. Feb 65, 62p
Rept. no. NOTS-TP-3645
Task RAV32N001 216 1F008 02 002
NAVWEPS 8617

Unclassified report

Descriptors: (*Visual acuity, Target acquisition), (*Target acquisition, Visual acuity), (*Aerial reconnaissance, Visual acuity), Reconnaissance planes, Military personnel, Target recognition, Target discrimination, Optics, Atmosphere, Terrain, Human engineering, Psychophysiology.

The purpose of this report is to discuss the geometric, kinematic, physical, and human engineering aspects of air-to-ground search. The results of pertinent analytic and experimental investigations are presented and briefly discussed. Although the value of these investigations is assessed, no attempt has been made to perform a comprehensive evaluation of each of them.

AD-612 846 Div. 6, 30

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A LAMBDA/4 AND LAMBDA/2 SHIFT METHOD FOR ELIMINATION OF UNWANTED WALL-ECHOES IN RADAR-ANECHOIC CHAMBERS,
by J. H. Halberstein and P. C. Fritsch. 22 Jul 64,
1p

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (U. S.) v52 n12 p1743-4 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radar reflections, Scattering), (*Radar echo areas, Anechoic chambers), (*Anechoic chambers, Radar echo areas), Radar interference, Electromagnetic fields, Vector analysis, Radar antennas, Radar targets.

It is shown that, by measuring six vectors as functions of the aspect angle and carrying out a number of vector operations, the interference caused by the walls of a radar anechoic chamber may be substantially reduced.

AD-612 887 Div. 6
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
STATISTICS OF THE RADAR CROSS SECTION OF A VOLUME OF CHAFF,
by S. L. Borison. 10 Feb 65, 16p
Group rept. no. GR-1965-10
Contract AF19 628 500, ARPA Order 498
ESD TDR-65-46
Unclassified report

Rept. on Proj. DEFENDER.

Descriptors: (*Radar echo areas, Radar confusion reflectors), (*Radar confusion reflectors, Radar echo areas), Electromagnetic wave reflections, Scattering, Statistical analysis, Statistical processes, Probability, Integral equations, Statistical functions.

The average and standard deviation of the radar cross section of chaff is computed under the assumptions that dipoles are randomly oriented and randomly distributed within a radar resolution volume. For a single type of chaff, the standard deviation approaches the average value as the average number of dipoles increases. When the number of dipoles per resolution volume is small, the statistics of the single dipole cross section are important. The results are then generalized to the case of several types of dipoles distributed in space. The average cross section is simply the sum of the average cross sections for each type; however, the standard deviation involves additional terms which are not small. These terms are just sufficient to again provide the Rayleigh limit (delta s/<s> approaches limit of 1) as the number of dipoles increases. (Author)

AD-612 922 Div. 6, 31
CFSTI Prices: HC$2.00 MF$0.50

Navy Underwater Sound Lab., New London, Conn.
EFFECTS OF CERTAIN SHIP MOTIONS ON CABLE TENSIONS IN SYSTEMS FOR HANDLING SUBMERGED BODIES,
by Frank B. Rakoff. 7 Aug 62, 27p
Rept. no. USL-558
Projs. 1 650 01 00, S F001 03 09 8056
Unclassified report

Descriptors: (*Towing cables, Strain (Mechanics)), (*Ships, Motion), (*Towed sonar, Handling), Towed bodies, Stresses, Equations, Acceleration, Recovery, Velocity.

Certain conclusions are reached concerning the characteristics of towed bodies, especially ship-towed fish or sonar systems, with respect to weight and mass. The more important conclusions are: (1) The towline tension of any fish-ship combination will be zero when the downward magnitude of the acceleration of the towpoint at the ship is greater than the downward acceleration of the fish. This phenomenon can occur because the only forces available to accelerate the fish are its water weight and its vertical drag. (2) The zero tension point will occur while the fantail of the ship is moving up after it has passed its normal trim position. The towed body will continue to rise until it has reached zero velocity (at time t2), then fall until it is again captured by the towline (at time t3) which has continued its normal motion. The report gives equations describing the path of the towed body, and the consequences of the ultimate recapture of the body.

AD-612 926 Div. 6, 5, 12, 19
CFSTI Prices: HC$2.00 MF$0.50

Pan American World Airways, Inc., Tucson, Ariz.
U. S. ARMY RFCP SPECTRUM SIGNATURE PROGRAM.
Quarterly progress rept. no. 5, 1 Nov 64-31 Jan 65. Feb 65, 36p
Contract DA02 086AMC0032R, Proj. 1G6 20501D449
Unclassified report

Descriptors: (*Radiofrequency spectroscopy, Communication equipment), (*Communication equipment, Radiofrequency spectroscopy), (*Radio equipment, Radiofrequency spectroscopy), (*Radar equipment, Radiofrequency spectroscopy), Army, Navigational aids, Guidance, Countermeasures, Signal generators, Spectrum analyzers, Transponders.

Purpose: The purpose of the contract is (1) To prepare detailed spectrum signature measurement plans for Army communications-electronic equipments, conduct special studies and investigations, present briefings related to the Army Spectrum Signature program, and submit the resulting reports to the Government. (2) To perform spectrum signature measurements on Army communications-electronic equipments, validation measurements, and special measurement tasks. Process the data obtained and submit the results to the Government. (3) To prepare detailed feasibility studies and implementation plans covering modification and expansion of available facilities and techniques to increase the Army's capability for test and evaluation of communications-electronic equipments. Fabrication of two prototype USAEPG Model IB-1 test units was completed. These units were used to gather statistical data on the characteristics of operational AN/VRC-12 equipment at Fort Hood, Texas.

AD-612 960 Div. 6, 25, 26
CFSTI Prices: HC$3.00 MF$0.75

Lansdale Div., Philco Corp., Pa.
PEM FOR GOLD-DOPED GERMANIUM INFRARED DETECTOR TYPE IR400.
Quarterly progress rept. no. 8, 1 Oct-31 Dec 64,
by A. Guimento. 31 Dec 64, 75p
Contract DA36 039AMC01464E, Proj. H200
Unclassified report

See also AD-609 028.

Descriptors: (*Infrared detectors, Manufacturing methods), (*Germanium, Infrared detectors), Environmental tests, Life expectancy, Gold, Impurities, Performance (Engineering), Signal-to-noise ratio, Electrical properties.

Preproduction tests were made. The samples underwent visual and mechanical inspection and the cell resistance, optimum bias, and detectivity were tested. The remaining electrical parameters, frequency response, effective time constant, noise spectrum and spectral response, were measured. Results of these tests are presented.

AD-613 039 Div. 6, 19
CFSTI Prices: HC$4.00 MF$0.75

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
ELECTRONIC OBSERVERS FOR RADIO DIRECTION FINDING,
by Robert S. Smith. Feb 65, 105p
Publication no. RRL-273; TR-11
Contracts Nobsr64723, Nobsr89229

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Direction finding, Radio equipment), (*Radio equipment, Direction finding), Radio signals, Amplitude modulation, Monitors, Display systems, Communication theory, Statistical analysis, Programming (Computers), Navigational aids, Detection, Data processing systems.

Automated bearing readout methods are investigated for the Wullenweber wide-aperture radio direction finder, with particular attention to the effects of amplitude modulation on bearing readout. An examination of a generalized RDF system is given to show the potential effects of the various components on bearing readout accuracy, and the state of the art in RDF systems and readout methods is reviewed. The system to be used for this study, the Wullenweber wide aperture set, is described in detail, noting the pertinent characteristics for this study. Some statistical characteristics involved in readout problems are discussed and the three basic requirements for the application of Wiener's work in time series are noted, along with the nature of the output ensemble from the DF receiver. Tchebysheff's inequality is applied to the prediction of sample size requirements, and some sampling rate considerations are noted in the light of the predicted sample sizes.

7. Electrical Equipment

AD-612 481 Div. 7, 26
CFSTI Prices: HC$1.00 MF$0.50

Assembly Products, Inc., Chesterland, Ohio.
PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE.
Quarterly progress rept. no. 7, 1 Nov 64-31 Jan 65, by R. H. Nichols. 31 Jan 65, 8p
Contract DA36 039AMC01473E

Unclassified report

Also see AD-609 510.

Descriptors: (*Measuring devices (Electrical and Electronic), Manufacturing methods), Suspension devices, Voltmeters, Ammeters, Performance (Engineering), Environmental tests, Temperature, Thermal shock, Impact shock, Shock (Mechanics), Humidity, Moistureproofing, Production, Specifications.

Tests on six refined sample meters, were concluded. The tests were to determine the capability of passing all the specifications (SCS-160 and MIL-M-10304B). Potential problems were discovered in thermal shock, moisture resistance, and high impact shock tests. Problems reported in Quarterly Report no. 6 which were found in the response time, power consumption, and overload tests were solved. The final design of nearly all parts which will require tooling has been completed. An extensive investigation of the causes of band breakage was begun involving large scale microscopic inspection and shock testing. (Author)

AD-612 492 Div. 7, 4
CFSTI Prices: HC$3.00 MF$0.75

Gulton Industries, Inc., Methuchen, N. J.
LITHIUM-NICKEL HALIDE SECONDARY BATTERY INVESTIGATION.
Final technical rept. for Dec 63-Dec 64, by A. Lyall, H. N. Seiger, and R. C. Shair. Jan 65, 59p
Contract AF33 615 1266, Proj. 8173, Task 817304
APL TR-65-11

Unclassified report

Descriptors: (*Storage batteries, Preparation), (*Electrodes, Electrochemistry), (*Electrolytes, Compatibility), Lithium compounds, Nickel compounds, Halides, Chlorides, Fluorides, Electrolytic cells, Alkenes, Carbonates, Aluminum compounds, Electrical conductance, Chlorination, Binders, Methyl cellulose, Battery separators.

The report encompasses a study of the electrode processes, the electrolyte, and cell components of the nickel chloride-lithium cell. Compatability test results are discussed and recommendations for cell components made. Electrolytes, based on the compatability tests, were made and evaluated. A major modification to the propylene carbonate - AlCl3 electrolyte was made. The electrolyte is chlorinated and the excess chlorine scavenged with lithium metal. This modification has greatly reduced the kinetic polarization originally associated with the nickel chloride electrode. A satisfactory lithium electrode was prepared by pasting an oil mixture of powdered lithium, carbonyl nickel and a carboxymethylcellulose binder on an expanded nickel screen. Three good separator materials were found for the chloride system. Through the technique of 'formation cycling', nickel chloride electrodes were prepared which yield 80% utilization of the theoretical capacity. Concentration polarization at the nickel chloride electrode restricts the discharge rate to C/40 and charge rates to C/20. Methods of reducing the concentration polarization are outlined. (Author)

AD-612 602 Div. 7
CFSTI Prices: HC$1.00 MF$0.50

Minnesota Mining and Mfg. Co., St. Paul.
300 WATT PORTABLE THERMOELECTRIC GENERATOR,
Monthly progress rept. no. 5 for period ending 28 Feb 65,
by R. D. Carlton. 28 Feb 65, 5p
Contract N600 61533 62758

Unclassified report

See also AD-611 398.

Descriptors: (*Thermoelectricity, Power supplies), (*Generators, Thermoelectricity), (*Electric power production, Thermoelectricity), Portable, Thermocouples, Fuel system, Heat exchangers, Energy conversion, Cooling, Voltage regulators, Circuits, Design, Wiring diagrams.

Detail and assembly drawings for the generator were completed. A modification of the burner resulted in a heat flux of 41 watts/sq in at an efficiency of 65.5%. Test fixtures for the thermoelectric couples are being fabricated.

AD-612 710 Div. 7, 8, 30
CFSTI Prices: HC$2.00 MF$0.50

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
RESEARCH ON NEW CONCEPTS IN ENERGY CONVERSION.
Quarterly technical progress rept. no. 6,
1 Dec 64-28 Feb 65,
by William D. Jackson, George A. Brown, Jack L. Kerrebrock, and Robert E. Stickney. 15 Mar 65, 34p
Contract AF33 615 1083, Proj. 8173, Task 817306

Unclassified report

See also AD-610 673.

Descriptors: (*Energy conversion, Magnetohydrodynamics), (*Magnetohydrodynamics, Power supplies), (*Thermionic converters, Materials), Laminar flow, Induction systems, Potassium, Electrical conductance, Vapors, Thermionic emission, Hall effect, Alkali metals, Generators, Adsorption, Chemical bonds.

Contents: Magnetohydrodynamic induction machine with laminar fluid flow; Behavior of dry potassium vapor in electric and magnetic fields; Bonding mechanism of alkali-metal atoms adsorbed on metal surfaces.

AD-612 766 Div. 7, 4
CFSTI Prices: HC$7.00 MF$1.75

General Electric Co., West Lynn, Mass.
HYDROCARBON-AIR FUEL CELLS.
Semi-annual technical summary rept. no. 6,
1 Jul-31 Dec 64,
31 Dec 64, 354p
Contracts DA44 009ENG4909, DA44 009AMC479T, ARPA Order 247

Unclassified report

Continuation of Contract DA44 009ENG3771.
Rept. on Fuel Cell Research and Development.

Descriptors: (*Fuel cells, Electrochemistry), (*Hydrocarbons, Fuel cells), Air, Oxidation, Catalysis, Electrolytes, Electrodes, Tests, Operation, Performance (Engineering), Surface properties, Hydrogen compounds, Cesium compounds, Fluorides, Boron compounds, Carbides, Platinum, Binders, Halocarbon plastics, Reinforcing materials, Asbestos.

Detailed information is presented on a continuing research and development program to develop a direct hydrocarbon oxidation-air fuel cell technology. Current work included research on electrochemical oxidation processes, electrocatalysts, electrolytes, electrode structure, fuel cell life testing, and studies of self-sustaining operation. Multi-pulse potentiodynamic techniques were further developed for analyzing hydrocarbon surface processes. Performance of fuel cell systems with hydrogen fluoride and cesium fluoride electrolytes were studied for high performance hydrocarbon oxidation. Boron carbide was successfully employed as a substrate for high surface area platinum, and the results and application to Teflon bonded electrodes are reported. A variety of modified Teflon-bonded developmental electrodes were evaluated including the initial results of asbestos reinforced Teflon. Performance and electrode life in excess of 3000 hours on best electrodes are reported for a variety of hydrocarbon fuels. Studies to define the requirements for self-sustaining operation are also included. (Author)

AD-612 901 Div. 7, 25
CFSTI Prices: HC$5.00 MF$1.25

International Research and Development Co., Ltd., Newcastle (England).
RESEARCH PROGRAMME ON MAGNETOPLASMADYNAMIC POWER GENERATION.
Final technical summary rept. for 1 Apr-31 Jul 64, by B. C. Lindley. 31 Jul 64, 185p
Rept. no. IRD-64-59
Contracts N62558 3127, N62558 4180, ARPA Order 209 62
Unclassified report

See also AD-602 381.

Descriptors: (*Magnetohydrodynamics, Electric power production), (*Electric power production, Magnetohydrodynamics), Energy conversion, Fluid flow, Helium, Cesium, Injection, Recovery, Ducts, Instrumentation, Microwaves, Gas ionization, Electron beams, Heat transfer, Bibliographies.

Contents: Loop operation; Power generation experiments; Cesium injection and recovery; Generator duct; Instrumentation; Future programme; Microwave studies on non-equilibrium plasma; Atomic beam experiment; Microwave studies of thermally-excited plasmas; Heat transfer and pressure loss calculations for He-He recuperative heat exchanger.

AD-613 027 Div. 7, 5, 33
CFSTI Prices: HC$3.00 MF$0.75

Bernard Electronics Co., Washington, D. C.
WIRELESS CONTROL SYSTEM FOR AIRPORT LIGHTING.
Final rept.,
by Arthur H. Ballard. Jan 65, 70p
Contract FA WA4632, Proj. 221 140 02C423 1
SRDS RD-65-8
Unclassified report

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Descriptors: (*Lighting equipment, Airports), (*Radio communication systems, Remote control systems), (*Remote control systems, Lighting equipment), (*Command and control systems, Lighting equipment), Navigational aids, Marker lights, Approach light, Actuators, Multiplex, Radio equipment, Telemeter systems, Air traffic control terminal areas, Aviation safety, All-weather aviation.

An experimental system for wireless control and monitoring of airport lighting was developed with the objective of providing a cheaper more flexible and reliable system than existing cable systems. The system provides 16 channel capacity on a single FM carrier with a maximum range of 3 miles. Three channels (selectable) provide on-off, 5-step of continuous control in the form of 0-10 volt dc commands. Remote stations reply automatically with identical signals to actuate displays at the master station. Electrical comparison of signals indicate incorrect reply or failure in any channel. Fail-safe provisions at each remote station switch the lighting equipment to full on, full off, or the last commanded brightness in the event of system failure. High spectrum efficiency, and maximum rejection of noise, cross-talk, and interference is achieved through the use of a previously developed multiplex technique. Orthogonal pulse waveforms are employed as subcarrier signals, which are generated digitally and amplitude-modulated by diode multipliers. (Author)

AD-613 031 Div. 7
CFSTI Prices: HC$3.00 MF$0.75

Pratt and Whitney Aircraft, East Hartford, Conn.
LIQUID HYDROCARBON FUEL CELL DEVELOPMENT.
Final technical rept. for 27 Jul 64-27 Jan 65, by H. H. Heilbronner, W. P. Levins, and J. W. Allison.
27 Jan 65, 73p PWA-2549
Contract DA44 009AMC756T
Unclassified report

Descriptors: (*Hydrocarbons, Fuel cells), (*Fuel cells, Hydrocarbons), Fuels, Regeneration, Electrodes, Palladium, Silver, Anodes (Electrolytic cell), Feasibility studies, Performance (Engineering), Fluid flow, Current, Catalyst, Hydrogen, Test methods, Test equipment.

A compound anode consists of a reforming catalyst bed in direct contact with a palladium-silver fuel cell anode. The objective of this study was to prove the feasibility of operating a compound anode fuel cell on a liquid hydrocarbon and to define the important parameters that influence cell performance. Both reformer and fuel cell tests were conducted with various liquid hydrocarbon fuels. Included in this report is a description of the compound anode and test facilities used in this study. The profound effect of hydrogen extraction on the equilibrium of the reform reaction and the feasibility of operating a fuel cell of this type is demonstrated. The effects of the fuel, catalyst bed depth, catalyst particle size and baffling on the cell performance are discussed. (Author)

AD-613 099 Div. 7, 15

Air Force Avionics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
ON METHODS OF POLYNOMIAL DECOMPOSITION IN ACTIVE NETWORK SYNTHESIS,
by George R. Branner. 25 Mar 63, 4p
Technical rept. no. AL-TR-64-301
Proj. 7031
Unclassified report

Pub. in I E E E Transactions on Circuit Theory (U. S.) vCT-10 n4 p525-6 Dec 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Networks, Synthesis), (*Numerical methods and procedures, Topology), (*Polynomials, Topology), Electrical engineering, Functions, Transformations (Mathematics), Numerical analysis.

Recently, Mitra (J. Franklin Inst., vol. 274: 115-129 (1962)) has developed a new procedure for rational function decomposition which imposes no restrictions on prescribed functions except that they must be real rational functions of a complex variable. This decomposition is obtained by considering the driving point synthesis problem in terms of the reflection coefficient. It is the purpose here to provide an alternate method of obtaining the Mitra Decomposition by considering the tangent of the angle function of a positive real function.

8. Electronics and Electronic Equipment

AD-612 496 Div. 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Westinghouse Electric Corp., Washington, D. C.
500 WATT SILICON POWER TRANSISTOR.
Quarterly rept. no. 6, 1 Nov 64-31 Jan 65,
31 Jan 65, 22p
Contract NObsr91001, Proj. SR0080304, Task 9347
Unclassified report

Descriptors: (*Transistors, Silicon), (*Silicon, Transistors), Manufacturing methods, Encapsulation, Electric wires, Bonding, Voltage, Tests, Surfaces properties, Diffusion.

The first state-of-the-art samples including all process techniques were produced during the quarter. Process techniques employed in making these samples and the results obtained are discussed. Fabrication refinements are outlined. The collector contacting and encapsulation techniques are discussed. (Author)

AD-612 506 Div. 8, 25
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., White Oak, Md.
THE EFFECT OF SINUSOIDAL RIPPLE CURRENT UPON THE TEMPERATURE DIFFERENCE ACROSS A THERMOELECTRIC COOLING DEVICE.
Master's thesis,
by Thomas R. McKnight. 1 Jul 64, 94p
Rept. no. NOLTR-64-4
Unclassified report

Descriptors: (*Thermoelectricity, Cooling and Ventilating Equipment), (*Cooling, Thermoelectricity), Electric currents, Theory, Temperature, Equations, Bismuth alloys, Tellurium alloys, Semiconductor devices.

This paper is an examination of the effect of supply current ripple upon thermoelectric cooling device performance. A theoretical equation is derived that relates cooling device performance as a function of the driving electrical current. This equation is then verified with data obtained in tests on a practical cooling device. The effect of ripple was determined to be a decrease in the attainable temperature drop across the device. (Author)

AD-612 511 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
EFFECTIVE LENGTHS OF ANTENNAS IN MAGNETO-IONIC MEDIA.
Interim rept.,
by William R. Faust. 12 Feb 65, 10p
Rept. no. NRL-6190
Proj. SF019 02 02 7447
Unclassified report

Descriptors: (*Antenna configurations, Ionospheric propagation), (*Ionospheric propagation, Antenna configurations), Satellite antennas, Electrical properties, Plasma physics, Ionosphere, Radio waves, Propagation, Theory, Mathematical analysis.

The voltages induced in dipoles and loop antennas immersed in a magneto-active plasma are calculated using the Rayleigh-Carson theorem for magneto-active media as derived in NRL Report (AD-610 009). The voltage induced is given in terms of an effective length times the applied electric field, and in the present case the tensor dielectric character of the magneto-ionic medium complicates the effective length calculations. A first approximation for the effective length of a linear dipole in a magnetoactive plasma is derived which can be used if the antenna is short. Because loop antennas are also used in ionospheric propagation experiments, the ratio of the voltage induced in a small loop antenna to that induced in a dipole antenna is derived. (Author)

AD-612 514 Div. 8
CFSTI Prices: HC$0.75 MF$0.50

Naval Research Lab., Washington, D. C.
A STUDY OF THE SOOHOO-TYPE FERRITE CUTOFF SWITCH.
Interim rept.,
by W. H. Mendenhall, Jr. 15 Feb 65, 24p
Rept. no. NRL-6203
Proj. SR008 03 02 9637
Unclassified report

Descriptors: (*Electronic switches, Ferrites), (*Ferrites, Electronic switches), (*Waveguide switches, Ferrites), X band, Microwave equipment, Theory, Experimental data, Radiofrequency power, Design, Magnetic fields.

The characteristics of the Soohoo-type cutoff switch (IRE Trans. Microwave Theory Tech., Vol. MTT-7, no. 3, July 1959, p. 332-6 and 334-5) have been measured at X band. Two types of switch configuration were employed; in one, a single ferrite slab was placed against a waveguide sidewall, and in the other two ferrite slabs were placed against opposite sidewalls. The switch is made to operate between an 'on state' (or propagation state) and an 'off state' (or reflection state) by application of a transverse magnetic field to the ferrite. This action reduces the effective waveguide width and causes cutoff. Low-power-level switching characteristics were studied as a function of switch geometry, and a group of switches meeting minimal specifications were selected for study at high-power level. The effect of varying waveguide width, the variety of ferrite used, and the width of the ferrite slab on nonlinear loss were studied at high-peak-power level as a function of applied magnetic field. Some techniques which tended to reduce nonlinear loss were noted. (Author)

AD-612 528 Div. 8

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ARRAY ANTENNAS: NEW APPLICATIONS FOR AN OLD TECHNIQUE,
by John L. Allen. 1964, 16p
Unclassified report

(Courtesy of and developed by Hughes Aircraft Co. under Contract AF30 602 2415, sponsored by RADC.)
Pub. in IEEE Spectrum (U. S.) p115-30 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Antenna configurations, Theory), (*Radar antennas, Antenna configurations), Phased arrays, Antenna lobes, Electrical impedance, Luneberg lens antennas, Dipole antennas, Errors, Radio astronomy.

Antenna arrays exist in a wide variety of configurations, with the number of radiating elements ranging from two to several thousand. However, all are governed by the same fundamental principles, which are described in this article. (Author)

AD-612 537 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
EXPERIMENTAL OBSERVATION OF THE CREEPING WAVE PHENOMENON IN BACKSCATTER USING A SHORT PULSE RADAR SYSTEM,
by D. F. Sedivec and D. E. Foreman. 14 Jan 65, 24p Group rept. GR-1965-3
Contract AF19 628 500
ESD TDR-65-28

Unclassified report

See also AD-600 411.

Descriptors: (*Radar, Scattering), Radar echo areas, Radar antennas, Polarization, Spheres, Ogives, Conical bodies.

The short pulse radar return of two bodies was measured to determine the contribution of individual scattering elements to the overall cross section. Evidence is presented which appears to verify the existence of the creeping wave echo and shows it to be the predominant contribution to the return from these bodies at nose-on incidence. (Author)

AD-612 538 Div. 8, 25
CFSTI Prices: HC$4.00 MF$1.00

Microwave Associates, Inc., Burlington, Mass.
APPLIED RESEARCH ON COUPLING SCHEMES FOR PLASMA AMPLIFIERS.
Final engineering rept. for 1 Oct 63-30 Nov 64,
by Paul Chorney. 8 Mar 65, 117p
Contract AF33 615 1110, Proj. 4 6799 4156 03
AL TR-65-53

Unclassified report

Descriptors: (*Plasma physics, Microwave amplifiers), (*Microwave amplifiers, Plasma physics), (*Electron beams, Plasma medium), (*Waveguide couplers, Microwave amplifiers), Theory, Space charges, Electromagnetic waves, Fourier analysis, X band, Alignment, Steel, Copper, Glass, Klystrons, Zenon, Gases, Antenna feeds, Cathodes, Cavity resonators, Ceramic materials.

The concept of gap coupling to a beam-plasma system is studied. The theory of space-charge waves on one dimensional beam plasma systems is reviewed. The kinetic power associated with the complex waves of the system is examined, and it is proved that power can be extracted from the system even though the individual space-charge waves can carry no power. The action of an applied field on the space-charge waves is examined, and expressions for coupling coefficients are obtained. Computations of the coefficients predict that strong coupling can be obtained with long transit-angle gaps because of the complex waves. The problem of gap coupling to a beam-plasma waveguide is treated by a Fourier analysis, with the result that expressions are obtained for the coupling to each of the modes. X-band experiments are described on 3 study vehicles, each containing 2 plasma gap couplers and 2 re-entrant cavities as standard references. The presence of the plasma enhances the transmission of signals between the various parts of the study vehicles. The beam should be located close to the gap, but the gap width can be very long in terms of transit angle. Work is described on a feed system based on the quasi-optical properties of an ellipse.

AD-612 594 Div. 8

Antenna Lab., Calif. Inst. of Tech., Pasadena.
ELECTROMAGNETIC RADIATION IN THE PRESENCE OF MOVING SIMPLE MEDIA,
by K. S. H. Lee and C. H. Papas. 9 Jun 64, 4p
Technical rept. no. TR-33
Contract AF49 638 1266
AFOSR 65-0391

Unclassified report

Pub. in Journal of Mathematical Physics (U. S.) v5 n12 p1668-72 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Wave transmission, Dielectrics), (*Electromagnetic waves, Dielectrics), Differential equations, Green's function, Vector analysis, Isotropism.

The radiation pattern of an arbitrary source immersed in a moving simple medium is calculated by deducing the differential equation for the potential 4-vector in the rest frame of the source and then solving the equation in terms of a Green's function. As an illustrative example, the case where the source is an oscillating dipole is worked out in detail. (Author)

AD-612 596 Div. 8
CFSTI Prices: HC$4.00 MF$1.00

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
NETWORK SYNTHESIS WITH TRANSMISSION LINE ELEMENTS,
by Herbert J. Carlin. Feb 65, 117p
PIBMRI-1235-64
Contract AF30 602 2868, Proj. 8505, Task 850501
RADC TDR-64-505

Unclassified report

Descriptors: (*Microwave networks, Synthesis), (*Transmission lines, Microwave networks), Electrical networks, Electrical impedance, Filters (Electromagnetic wave), Transformers, Scattering.

The work consists of two parts. In part I a technique for the realization of cascaded commensurate transmission line networks of uniform propagation constant, is presented directly in terms of the scattering formalism without recourse to impedance representations by applying Richards' transformation. Necessary and sufficient conditions for realizability are presented and applications to transformers, linear phase systems, and low-pass filters are given. In part II realizable band-pass (zero of transmission, i.e., infinite loss, at d.c.) equiripple gain functions are constructed which permit physical realization of systems consisting of cascaded lines and stubs. The method is illustrated by designs of filters, as well as a new form of broad band transformer in which the low frequency response is suppressed by a shunt stub. (Author)

AD-612 597 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Sperry Gyroscope Co., Great Neck, N. Y.
Radiation Div.
TRANSIENT BEHAVIOR OF LARGE ARRAYS.
Interim rept. for 1 Jul-15 Oct 64,
by G. F. Ross, L. Susman, and J. Hanley. Feb 65, 94p Rept. no. EB-5287-0500-2
Contract AF30 602 3348, Proj. 4506, Task 450604
RADC TDR-64-506

Unclassified report

Descriptors: (*Antenna feeds, Microwave networks), (*Microwave networks, Transients), (*Waveguides, Transients), Microwave equipment, Radar signals, Phase shifters, Ultrahigh frequency, L band, Power

dividers, Electronic switches, Mixers (Electronic), Coupling circuits, Linear systems, Partial differential equations, Mathematical analysis, Delay lines, Filters (Electromagnetic waves), Theory.

Results of the second phase of a theoretical and experimental investigation of the transient behavior of microwave components used in feed networks of large antenna array systems are reported. Various combination networks treated include cascade connections of power dividers, switches, ring hybrids and directional couplers. The major emphasis of this report concerns the transient behavior of commonly used waveguide components. First, the transient response of straight sections of rectangular waveguide is found. The effect of coax-to-waveguide adapters on the transient response of sections of waveguide is considered, and first order approximations are used to estimate settling time for a step-modulated input excitation. These approximate results and the results reported in the first quarterly report are used to establish solutions for the more complicated waveguide components, namely the branch wall coupler and magic tee. Experimental results of the transient behavior of L-band TEM mode combination networks and waveguide structures are presented. Finally, a new technique for the generation of synchronized step-modulated signals at L band is presented.

AD-612 599 Div. 8, 26
CFSTI Prices: HC$6.00 MF$1.25

General Electric Co., Syracuse, N. Y. Semiconductor Products Dept.
PRODUCTION ENGINEERING MEASURE. ITEM 3: SILICON PLANAR EPITAXIAL TRANSISTOR.
Final rept. for 1 May 62-28 Feb 64,
by A. S. Rugare. 28 Feb 64, 223p
Contract DA36 039SC86727E

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Transistors, Production), (*Silicon, Transistors), Epitaxial growth, Reliability (Electronics), Performance (Engineering), Processing, Boron, Phosphorus, Diffusion, Electric wire, Bonding, Encapsulation, Quality control, Life expectancy, Management engineering.

The report presents a detailed narrative of the results of investigations conducted from May 1962 to February 1964 in each of the following task: improved KPR resolution, collector etching, contact evaporation and alloying, boron diffusion phosphorus diffusion collector contact to the Header, interconnections, reliability measurement, process specifications, quality control manual, and production quality test. Data, sketches, and photographs relative to the work are included with the discussion of work accomplished relative to each task.

AD-612 603 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

Systems, Inc., Orlando, Fla.
PEM FOR FILTERS, UPPER SIDEBAND, (1.75 MC.) QUARTZ CRYSTALS TYPE EL-FR (X-1).
Quarterly progress rept. no. 2, 30 Sep-31Dec 64.
31 Dec 64, 24p
Contract DA36 039AMC03636E

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-609 716.

Descriptors: (*Crystal filters, Manufacturing methods), (*Quartz, Radiofrequency filters), Band-pass filters, Capacitance, Crystals, Design, Sidebands, Coils, Performance (Engineering), Electrical properties, Vibration, Shock resistance, Medium frequency.

The type III filter, a 12 crystal, equal motional capacitance design, were analyzed to determine the effects of crystal and coil losses. Two filters were constructed and the test results presented. Crystal designs were evaluated to determine the best techniques for the present application. The most desirable design, using elliptically beveled blanks, was finalized and evaluated.

AD-612 609 Div. 8, 2
CFSTI Prices: HC$4.00 MF$0.75

Geoscience, Inc., Lexington, Mass.
DEEP RESISTIVITY RESULTS FROM NORTH CAROLINA, VIRGINIA, PENNSYLVANIA, WISCONSIN, AND MISSOURI.
Scientific rept. no. 5, Jan-Dec 64,
by Howard S. Lahman and Philip Nelson. Dec 64
104p
Contract AF19 628 2351, Proj. 4600, Task 460008
AFCRL 65-9

Unclassified report

See also AD-423 052.

Descriptors: (*Resistance (Electrical), Lithosphere), (*Lithosphere, Resistance (Electrical)), Igneous rock, Geophysics, North Carolina, Virginia, Pennsylvania, Wisconsin, Missouri, Structural geology, Wave transmission, Communication systems, Feasibility studies, Stratigraphy, Earth models.

Surface resistivity measurements of Precambrian igneous and metamorphic rocks reveal that high resistivities are not to be found in North Carolina, Pennsylvania, or in the vicinity of Farmville, Virginia or Merrill, Wisconsin. The Merrill, Wisconsin traverse may not be representative of Continental Shield exposures, however. Near Bedford, Virginia some high values were obtained, but actual resistivity over 100,000 ohm-meters is not probable. The St. Francois Mountains of Missouri yield high values suitable for layered interpretation but interpretation complications due to the small size of the area do not permit distinction between two and three layer models. In Missouri a minimum second layer resistivity of 20,000 ohm-meters is established, but the maximum cannot be established at present. The data allow a high resistivity layer. To a depth of at least one kilometer, in all areas covered, the data reflected the mapped lateral geologic and structural variations and indicated, in some cases, additional complications. (Author)

AD-612 617 Div. 8, 26
CFSTI Prices: HC$3.00 MF$0.75

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES (PEM) FOR A GERMANIUM MICROWAVE TRANSISTOR.
Quarterly progress rept. no. 1, 30 Jun-30 Sep 64.
30 Sep 64, 79p Rept. no. 03-64-73
Contract DA36 039AMC03632E, Proj. 74057

Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Microwave equipment, Transistors), (*Germanium, Transistors), Gain, Noise (Radio), Vapor plating, Silicon compounds, Dioxides, Packaging, Encapsulation, Inductance, Gallium, Impurities, Vacuum apparatus, Chemical milling, Diffusion, Arsenic, Gold, Reliability (Electronics).

The process flow used in fabricating the L-78 planar epitaxial germanium diffused-base transistor is described. The initial intrinsic f sub T of planar devices, approximately 1600 mc compared to 2050 mc for a mesa device of comparable design using similar fabrication techniques, was increased to equal that of the mesa by optimizing the composition of the emitter material. The L-78 planar devices fabricated exhibit minimum noise figure at 1.0 Gc of 4.5 to 5.5 db at approximately 1.5 ma of emitter current while peak f sub T occurs at approximately 5.0 ma. A modification of the L-78 pattern, designated L-78A, via emitter area reduction from 0.76 mil squared to 0.27 mil squared manifested itself by a shift in peak f sub T toward lower values of emitter current. The purpose of this modification is to bring into registry the peak gain of the device and minimum noise figure at one particular bias level. The materials used for the base stripes of the planar unit were optimized to provide good ohmic contact to germanium. Adherence of expanded contacts to the active region of the device, the emitter and base stripes, was improved by employing a chemical etch comprised of inorganic constituents. An excellent technique for uniformly depositing silicon dioxide onto germanium was obtained. A variation in the maximum to minimum thickness of the deposit across the slice was reduced from 10% to approximately 3%. A package suitable for the encapsulation of UHF transistors features minimum series inductance and high degree of mechanical rigidity.

AD-612 621 Div. 8, 14
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
DIELECTRIC-LOADED WAVEGUIDE SLOT ARRAYS,
by Howard S. Jones, Jr. 22 Jan 65, 35p
Rept. no. TR-1269
Projs. 26100, DA1P222901A207

Unclassified report

Descriptors: (*Slot antennas, Waveguides), (*Waveguide slots, Dielectrics), S band, L band, C band, Standing wave ratios, Propagation, Electrical impedance, Test equipment (Electronics), Materials, Bandwidth, Antenna radiation patterns, Performance (Engineering).

A class of slotted arrays that utilizes the principle of dielectric loaded waveguide is described. The physical design of these arrays for operation at C-, S-, and L-band frequencies is characterized by their unusually small volume. Design techniques, dielectric material characteristics, and theoretical concepts for practical array-designs are discussed. Simplified methods of construction are outlined, and the performance of each design type is presented. This includes data on design parameters, voltage standing wave ratio, and radiation pattern characteristics. These dielectric-loaded slot arrays offer substantial savings in volume, weight, and overall cost when compared with their conventional counterpart. A typical design (0.125 x 1.20 x 10.5 in.) at 5.4 Gc has a gain of 12.0 db, 16-deg elevation beamwidth, sidelobe level below 22 db, and a VSWR less than 1.5 over a 10-percent bandwidth. (Author)

AD-612 628 Div. 8, 25
CFSTI Prices: HC$5.00 MF$1.25

Microwave Lab., Stanford Univ., Calif.
FERRIMAGNETIC RELAXATION MEASUREMENTS AND MICROWAVE CIRCUIT PROPERTIES OF FERRITE ELLIPSOIDS.
Technical note,
by I. K. Anderson. Feb 62, 182p Rept. no. ML-880
Contract AF49 638 415, Proj. 47501
AFOSR 2121

Unclassified report

Descriptors: (*Microwave networks, Ferromagnetic materials), (*Ferromagnetic materials, Relaxation time), Magnetic resonance, Ferromagnetism, Ellipsoids, Ferrites, Waveguides, Wave transmission, Scattering, Mathematical analysis, Electrical impedance, Admittance, Garnet, Iron compounds, Yttrium compounds, Crystals, Transients, Damping, Simulation.

The paper describes the results of an experimental investigation of relaxation processes in microwave ferrites. A new experimental procedure was developed in which the contribution of the uniform precessional mode to the relaxation may be separated from that of the other spin modes by controlling the interaction between the ferrite sample and its microwave environment. To characterize this interaction in detail, scattering matrix and lumped-element equivalent circuit representations were developed for a section of uniform waveguide containing a small ferrite ellipsoid. The circuit representation was then used to discuss radiation damping in a variety of microwave structures. In contrast to previous theories, the results are valid even when the interaction is large, provided that the sample is not too close to a waveguide wall. This 'wall effect,' which takes the form of a shift, broadening and distortion of the resonance line, is discussed in some detail. Transient solutions were obtained for the rate equations which describe the deviation of the z-component of magnetization from its equilibrium value, in the presence of appreciable radiation damping.

AD-612 631 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
SCATTERING OF ELECTROMAGNETIC WAVES BY A HELICAL SHEATH CYLINDER,
by Chin-Lin Chen. 4 Nov 64, 46p
Scientific rept. no. SR-7
Contract AF19 628 2406, Proj. 5635, Task 563502
AFCRL 65-6

Unclassified report

Descriptors: (*Electromagnetic waves, Scattering), (*Cylindrical bodies, Electromagnetic wave reflections), Helixes, Boundary value problems, Harmonic analysis, Series, Plasma sheath.

The problem of scattering from a helical sheath has been investigated. A harmonic series solution is obtained for the case with TE-mode incidence. Due to the anisotropic nature of the boundary, both TE mode and TM mode are present in the scattered field and the transmitted field. The expressions for the total scattering cross section, the back scattering cross section and the current density distribution are also obtained. Some numerical results are presented for a helical structure with a radius that is small or moderate in comparison with the wavelength. A strange behavior as the pitch angle approaches pi/2 is found. The nature of this strange behavior is discussed in detail. (Author)

AD-612 632 Div. 8, 25
CFSTI Prices: HC$3.00 MF$0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
A DIAGNOSTIC THEORY FOR CYLINDRICAL PLASMAS BASED ON THE BORN APPROXIMATION,
by R. D. Ruquist. 15 Dec 64, 52p
Scientific rept. no. SR-8

Contract AF19 628 2406, Proj. 5635, Task 563502
AFCRL 65-87

Unclassified report

Descriptors: (*Plasma physics, Theory), (*Electromagnetic waves, Scattering), Field theory, Green's function, Bessel functions, Series, Fourier analysis, Dielectrics, Electron density, Cylindrical bodies.

The inverse scattering problem for a plane, axially polarized, electromagnetic wave incident upon a cylindrically symmetric inhomogeneous medium is solved under the Born approximation. The medium is characterized by its 'profile' defined by the inhomogeneous Helmholtz equation. The diagnostic procedures determine the dependence of collision and plasma frequency on radial position in the plasma cylinder.

AD-612 633 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Parke Mathematical Labs., Inc., Carlisle, Mass.
COMBINATORIAL PROPERTIES OF VARIABLE-LENGTH, ERROR-CORRECTING CODES,
by L. Calabi. Dec 64, 50p
Scientific rept. no. SR-2
Contract AF19 628 3826, Proj. 5628, Task 562801
AFCRL 65-28

Unclassified report

Rept. includes Appendix: The Theory of Index Correcting Codes, by J. A. Riley.

Descriptors: (*Coding, Combinatorial analysis), (*Combinatorial analysis, Coding), Communication theory, Corrections, Sequences, Inequalities.

The two theories of variable length codes and of error-correcting block codes are unified by extending many of their notions and results to suitably defined variable-length, error-correcting codes. The three principal notions studied are: (1) e -correcting codes, their relation with distance and McMillan inequality, (o-correcting = uniquely decipherable); (2) e -dense codes and their relations to various maximality properties studied in the literature; (3) e -exhaustive codes as the extension of Huffman's codes (e = o) and of closed-packed (block) codes. Various constructions and a test for error-correcting codes are given. (Author)

AD-612 635 Div. 8, 25
CFSTI Prices: HC$5.00 MF$1.25

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ELECTROMAGNETIC WAVE PROPAGATION ALONG A SINUSOIDALLY STRATIFIED DIELECTRIC SLAB,
by H. C. Wang. Dec 64, 192p
Research rept. no. PIBMRI-1227-64
Contract AF19 628 4324, Proj. 4600, Task 460004
AFCRL 65-85

Unclassified report

Descriptors: (*Dielectrics, Electromagnetic waves), (*Electromagnetic waves, Propagation), Scattering, Air, Configuration, Harmonic analysis, Special functions (Mathematical), Equations.

The guiding and scattering of electromagnetic waves in a periodically-stratified dielectric slab located in free space are investigated in detail. The problem is solved by representing the fields in both the air and the dielectric regions in terms of modes with propagation normal to the slab. For a field polarized along the y direction, these modes are Bloch exponentials in the air region and Mathieu functions in the dielectric. The study reveals that a discrete spectrum of bound (surface) waves and leaky (complex) waves may be supported by such a configuration. When the thickness of the slab becomes infinitely large, the configuration becomes a stratified dielectric half-space which may support only a continuous but not discrete spectrum of waves. The effect of the interface and the Wood's anomalies of the Rayleigh type are examined by expressing the interface discontinuity as an equivalent network for the propagating modes on both sides. For small modulation, simple analytical expressions are obtained and the network exhibits certain interesting properties.

AD-612 641 Div. 8, 26
CFSTI Prices: HC$4.00 MF$0.75

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Final rept., add.
1 Feb 65, 101p
Contract DA36 039sc85953

Unclassified report

Addendum to Final rept.

Descriptors: (*Triodes, Manufacturing methods), Electron tube parts, Electron tube heaters, Anodes (Electron tube), Cathodes (Electron tube), Coating, Seals (Stoppers), Performance (Engineering), Life expectancy, Tests, Statistical data, Reliability (Electronics), Data.

The purpose of this project is to determine the life results of the improved tube to 5000 hours and to determine the nature of any resulting failures so that information can be made available for possible tube or manufacturing improvements. Control tubes were constructed for extended life testing. These tubes are standard JAN 6299's; however, they do include some of the benefits of the improved cathode spray project. Cathodes were sprayed with the Paasche A-automatic spray gun and the improved masking fixtures were used. The cathodes were sprayed to the density being used prior to optimization of cathode spray. Tubes were constructed utilizing the improvements developed during the contract. These tubes and the control tubes were placed on life test. Values of characteristics at various time intervals were recorded for both PEM and Control samples. Statistics calculated from these sample data include: Mean values, variance, standard deviation, and coefficient of variation. Tables are given which show these statistics.

AD-612 643 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
INFINITE SHEATH HELICAL ANTENNA.
Interim rept.,
by Chin-Lin Chen. 20 Oct 64, 29p
Scientific rept. no. SR-5
Contract AF19 628 2406, Proj. 5635, Task 563502
AFCRL 65-5

Unclassified report

Descriptors: (*Helical antennas, Electromagnetism), (*Electromagnetism, Helical antennas), Helixes, Integral transforms, Potential theory, Electric currents, Distribution, Model tests, Plasma sheath.

The problem of an infinite sheath helical antenna driven by a ring delta generator is considered. The Fourier transform technique is used to solve this problem. It is found that if the radius of the helix is not too large, beta b < 2.4048, where beta = 2 pi/lambda and b is the

radius of the helix, the current density far away from the driving point can be decomposed into two terms. The first term is constant in magnitude and its phase velocity is less than the speed of light. It is a slow wave term. The second term dies out as 1/z(2), where z is the axial distance from the driving point, and has a constant phase velocity of beta. This is the radiation term. Near to the driving point, the logarithmic singularity exists just as in the case of an infinite linear, perfectly conducting dipole antenna. (Author)

AD-612 644 Div. 8
CFSTI Prices: HC$3.00 MF$0.50

Litton Industries, San Carolos, Calif.
RESEARCH ON NOISE IN CROSSED-FIELD GUNS.
Quarterly rept. no. 6, 1 Oct-31 Dec 64,
by R. P. Wadhwa. 20 Jan 65, 52p
Contract NObsr89546

Unclassified report

See also AD-608 594.

Descriptors: (*Microwave amplifiers, Crossed field devices), (*Crossed field devices, Noise (Radio)), (*Electron guns, Design), Gain, Space charges, Transformers, Electron beams, Ion beams.

The experimental data for a very low noise injected-beam crossed-field amplifier are given. Initially a noise-figure value of 3.5 with a small-signal gain of about 10 db and saturated power output of 14 watts was achieved. Under the best conditions a noise figure of 2.5 db with a small-signal gain of about 10.5 db and saturated power output of 18 watts has been achieved. A noise-figure reduction of several db is obtained by space-charge smoothing. The optimization of the various parameters in obtaining the low noise figure results is discussed. The dependence of the noise figure on the various parameters is investigated. The present low-noise amplifier has a noise transformer at the exit of the short Kino gun; the presence of this transformer also provides a good control on the beam optics and results in low-noise-figure values. The effect of mismatch at the output is investigated. A small-signal analysis for an idealized ion- and electron-beam system seems to indicate that the presence of ions does not add to any crossed-field interaction. However, the presence of ions can lead to poor optics, which results eventually, in a large noise content in the beam. (Author)

AD-612 647 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

Mallory (P. R.) and Co., Inc., Indianapolis, Ind.
PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
Quarterly rept. no. 6, 30 Sep-29 Dec 64,
by A. W. H. Smith. 29 Dec 64, 20p
Contract DA36 039AMC03623E

Unclassified report

See also AD-609 707.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Soldering, Sintering, Quality control, Production, Electrolytic capacitors, Anodes (Electrolytic cell), Wet cells, Manganese compounds, Dioxides, Powder metals, Environmental tests, Reliability (Electronics), Specifications, Performance (Engineering), Stresses.

Work was completed on the following tasks: presintering, soldering, and the third pilot run. The major portion of the sintering study was completed. Screening techniques were employed on the third pilot run units which will be life tested next quarter. The third pilot run provided a good opportunity for specification review. The processing specifications and the Quality Control Manual have been finalized. (Author)

AD-612 656 Div. 8, 15
CFSTI Prices: HC$4.00 MF$1.00

Electrical Engineering Research Lab., Cornell Univ., Ithaca, N. Y.
TRANSFORMATIONS FOR RADAR AMBIGUITY FUNCTIONS,
by Edward L. Titlebaum. Dec 64, 125p
Technical rept. no. TR-82, EERL-28
Contract DA36 039AMC00034E,
Task 1G6 22001A055 02

Unclassified report

Rept. on System Theory Research.
See also AD-239 427.

Descriptors: (*Radar pulses, Perturbation theory), (*Radar signals, Transformation), (*Integral transforms, Functional analysis), Wave transmission, Optimization, Communication theory.

This investigation sheds new light on the area of radar ambiguity functions and their ability to improve signal design. The problem is approached from two directions. First, a number of signal transformations are presented along with their corresponding ambiguity functions. These include both linear transformations induced by processing the signal through a linear time-variant system and nonlinear transformations generated by functional transformations upon the signal. Three simple linear signal transformations are shown to generate the allowable class of linear transformations of the ambiguity plane for signals that have rational or entire functions as their spectra. Hence, for the class of time-limited signals the complete class is presented. It is proven that nonlinear transformations of the ambiguity plane are restricted to only unrealistic signals. Second, the ambiguity function is perturbed in a number of ways in an effort to improve some quality of the signal for radar purposes. To this end tests based upon existing theorems are developed to determine the applicability of any particular perturbation. The class of linear transformations of the ambiguity function are presented in two forms: for ambiguity functions given in analytic and in digital form.

AD-612 658 Div. 8, 26
CFSTI Prices: HC$3.00 MF$0.75

Tung-Sol Electric, Inc., Bloomfield, N. J.
ELECTRON TUBES RADIATION RESISTANT PILOT LINE PRODUCTION.
Quarterly progress rept. no. 6, 1 Sep-30 Nov 64,
by John Grimm. 31 Dec 64, 63p
Contract DA36 039AMC01476E

Unclassified report

See also AD-611 556.

Descriptors: (*Electron tubes, Manufacturing methods), Nuclear particles, Radiation damage, Aluminum compounds, Silicates, Thermal stresses, Moisture, High-temperature research, Seals (Stoppers), Industrial equipment, Test equipment (Electronics), Reliability (Electronics).

The contractual work specified under Phase II has been continued. Fabrication and processing of all four tube types continued, so that sample tubes may be subjected

to the various destructive tests specified. High Temperature life testing (500C bulb temperature) was concluded on 6080WB Alumino-Silicate tubes, twenty-one now having successfully completed 500 or more hours of operation. Testing of alumino-silicate 6360 tubes was discontinued owing to premature life failure of the entire lot. The 1000-hour steady-state nuclear radiation exposure test was completed on both conventional and alumino-silicate tubes of all four types. The irradiated tubes were too radioactive to test. Thermal shock and moisture resistance tests were run successfully on representative tubes of all four types, in both conventional and alumino-silicate glass. The pulsed radiation exposure test, postponed due to trouble with the associated potted component circuitry, was revised to provide additional information. New approaches are being attempted in an effort to improve the low yield on 5886 and 6205 types meeting initial electrical characteristics. Both of these tubes are running 85 to 90% shrinkage. Radical departures from the present design are being followed in order to eliminate low emission. (Author)

AD-612 666 Div. 8
CFSTI Prices: HC$6.00 MF$1.50

Westinghouse Electric Corp., Elmira, N. Y.
DESIGN AND DEVELOPMENT INVESTIGATIONS OF A LOW NOISE, LINEAR, VARIABLE GAIN, R. F. AMPLIFIER TUBE.
Final rept. for 29 Jun 63-28 Feb 65,
by J. P. Pietrzyk, A. van der Jagt, and R. L. Pear.
26 Feb 65, 258p
Contract NObsr89530, Proj. SS296004, Task 7481
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-608 130.

Descriptors: (*Radiofrequency amplifiers, Electron tubes), (*Electron tubes, Radiofrequency amplifiers), Noise (Radio), Automatic gain control, Electron tube parts, Radiofrequency power, Harmonic analysis, Radiofrequency interference, Modulation, Reliability (Electronics), High frequency, Very high frequency, Performance (Engineering), Graphics.

A description is given of the development work for an RF amplifier tube, useable in the 0 - 200 Mc/s frequency range, which exhibits less interferences, as cross modulation, intermodulation, hum modulation and desensitization than in other, presently used, RF tubes. This tube is named tube type WX4733A. The development of a similar tube, indicated as tube type WX4733D, capable of a satisfactory amplification for a frequency range up to 400 Mc/s with a similar interference rejection, is also described. In addition, and evaluation of tube type WX4733A in the Navy receiver R390A is given.

AD-612 679 Div. 8, 14, 25
CFSTI Prices: HC$3.00 MF$0.75

IIT Research Inst., Chicago, Ill.
THIN FILMS FOR COMPOSITE MOLECULAR ELECTRONICS.
Final rept. for 1 Jan 62-31 Jan 63,
by F. V. Schossberger. May 63, 56p ARF-3213-13
Contract AF33 657 7823, Proj. 4150, Task 415003
ASD TDR-63-460
Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Molecular electronics, Materials), (*Semiconductor films, Preparation), (*Zinc compounds, Sulfides), (*Cadmium compounds, Sulfides), Single crystals, Hydrogen compounds, Sulfides, X-ray diffraction analysis, Electron diffraction analysis, Electron microscopy, Crystal structure, Resistance (Electrical), Hall effect, Diodes (Semiconductor), Vapor plating, Composite materials.

Monocrystalline films of zinc sulfide and cadmium sulfide 2 x 1 cm in size were prepared by reaction of monocrystalline (002) zinc or (101) cadmium surfaces with hydrogen sulfide. The formation of zinc sulfide films at 235C and of cadmium sulfide films at 135C was monitored in a specially built high-temperature x-ray diffractometer attachment. Reaction temperatures around 300C produced polycrystalline films. The film thickness varied from 10 to 1000 A and the rate of growth from 3 to 250 A per hour. Selected films were investigated by polarized-light and electron microscopy and by x-ray and electron diffraction. The hexagonal wurtzite structure was found, although one cadmium sulfide film had a different hexagonal structure. For electrical measurements of cadmium sulfide films, the films were isolated by coating with lacquer and dissolving the substrate in mercury. The resistivity was between 0.001 and 40 ohm-cm. Some areas showed good N-type asymmetrical diode characteristics. (Author)

AD-612 682 Div. 8, 6, 25
CFSTI Prices: HC$2.00 MF$0.50

ITT Industrial Labs., Fort Wayne, Ind.
IMPROVED QUANTUM EFFICIENCY LASER DETECTORS.
Interim engineering rept.,
by E. H. Eberhardt and J. L. Gumnick. 8 Mar 65,
38p Serial no. S-3312
Contract AF33 615 1596 Unclassified report
See also AD-606 680.

Descriptors: (*Lasers, Detectors), (*Detectors, Lasers), Optimization, Photocathodes, Photoelectric effect, Cesium alloys, Antimony alloys, Electron multipliers, Signal-to-noise ratio, Quantum mechanics, Optics, Theory, Experimental data.
During the second quarter both theoretical and experimental work were continued. Special attention was given to the influence of varying the angle of incidence of injected light on photoemissive yield both analytically and experimentally. Experimentally the effect of substrate type and thickness on yield was examined. A theoretical analysis was completed of film angular and thickness effects on photoelectric yield.

AD-612 683 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Engineering Research Lab., Univ. of Arizona, Tucson.
AN EXPERIMENTAL STUDY OF PLASMA SHEATH EFFECTS ON ANTENNAS,
by George Tyras, Peter C. Bargeliotes, John M. Hamm, and Robert R. Schell. Dec 64, 43p
Scientific rept. no. SR-1
Contract AF19 628 3834, Proj. 4642, Task 464202
AFCRL 65-53
Unclassified report

Descriptors: (*Antennas, Plasma sheath), (*Plasma sheath, Antennas), Antenna radiation patterns, Attenuation, Microwave equipment, Electrical impedance, Plasma medium, Simulation, Dielectric materials, Slot antenna, Theory.

A plasma simulation technique was developed which can be used to study the effects of homogeneous or inhomogeneous plasma sheath on the radiation pattern deterioration and input impedance of microwave antennas. A tank was designed and constructed for use in the simulation technique which can reproduce by means of real dielectric materials the dielectric constant encountered in plasma covered antenna research. The radiation patterns and the input impedances of an annular slot and a thin and long rectangular slot have been successfully measured in the presence of a simulated loss-less, homogeneous and isotropic plasma layer of varied thickness. Comparison with the available theoretical data indicates a generally good agreement, although some differences exist. In the case of the radiation patterns these differences are attributed to the finite distance between the radiator and the receiving antenna on one hand and the inherent inaccuracy of the saddle point method of integration in certain regions on the other hand. (Author)

AD-612 703 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
ACTIVE ACOUSTIC DEVICES.
Interim rept. for 17 Jun-30 Sep 64,
by W. H. Brendecke. Feb 65, 31p
Contract AF30 602 3478, Proj. 5578, Task 557802
RADC TR-64-517
Unclassified report

Descriptors: (*Transducers, Semiconductor devices), (*Acoustic equipment, Semiconductor devices), (*Semiconductor devices, Transducers), Electroacoustic transducers, Films, Vapor plating, Vacuum apparatus, Cadmium compounds, Sulfides, Epitaxial growth, Piezoelectric crystals, Quartz, Radiofrequency amplifiers, Ultrasonic properties, Surface properties, Resonance, Zinc compounds, Oxides, Very high frequency, Ultrahigh frequency, Solid state physics, Broadband, Phonons, Energy conversion.

Investigations of the six major transducer types were initiated to determine the feasibility of using each type in continuous wave (CW) devices. The most promising is the thin film transducer due to the close control of geometric factors. Exact control over placement, size and thickness can be achieved through selective masking and process deposition rates. Mechanical polishing limits the bonded quartz transducer to a maximum frequency of 175 mc/sec. Compensated region transducers with 2 to 3 db loss have been constructed between 10 and 30 mc/sec. The difficult growth process will limit epitaxial transducers to very preliminary experiments. Depletion layer transducers will be eliminated from further investigations due to the inability of II-VI compounds to form p-n junctions. (Author)

AD-612 714 Div. 8, 25
CFSTI Prices: HC$3.00 MF$0.75

Rhode Island Univ., Kingston.
THIN CYLINDRICAL CERAMIC TRANSDUCERS,
by N. T. Chieu and F. H. Middleton. 1 Oct 64,
82p Technical rept. no. TR-6
Contract Nonr39612, Projs. NR185 700, RR001 03 05
Unclassified report

Descriptors: (*Transducers, Underwater sound equipment), (*Ceramic materials, Transducers), Cylindrical bodies, Resonance, Rings, Electrical impedance, Propagation, Undersound signals, Model tests, Very low frequency, Low frequency.

Free-flooded thin cylindrical ceramic rings have distinct advantages in deep water transducer applications. Their actual behavior in different resonance modes is not well known. To study this problem an extensive review of the existing theories on the finite cylinder has been made, the advantages and disadvantages of each pointed out. Moreover, for model rings are used in the laboratory to study the problem experimentally. Ring pairs of 1.25 in and 1 in in diameter are identical except for heights which range from 1.5 in to 0.5 in. The frequency range is from 10 kc to 200 kc. The pulse technique is used and the results include response characteristics, impedance curves, radiation patterns and power output characteristics for both the free-flooded and air-backed arrangements. The same ring is used for flooded and pressure-relieved experiments so that there are no extraneous differences in the two cases. This is accomplished by means of a very thin membrane cemented to each end of the ring. The compliance of the membrane is so large that mechanical effects on the ring itself are negligible. (Author)

AD-612 717 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF A DOUBLE OCTAVE BANDWIDTH TRAVELING-WAVE TUBE AMPLIFIER.
Rept. no. 3, 1 Aug-30 Nov 64,
by B. P. Israelsen and F. T. Mauch. Feb 65, 23p
Contract AF30 602 3261, Proj. 5573, Task 557301
RADC TR-64-537
See also AD-608 221. Unclassified report

Descriptors: (*Traveling-wave tubes, Microwave amplifiers), (*Microwave amplifiers, Traveling-wave tubes), Broadband, Noise (Radio), Reduction, Helixes, Cathodes (Electron tubes), Radiofrequency power, Coatings, Binders, Voltage, Gain, Impedance matching, Performance (Engineering).

The purpose of the program is the attainment of low-noise amplification over two octaves in a single traveling-wave tube. Noise figure is to be less than 6 db from 2.0 to 8.0 Gc, with a minimum of ten milliwatts saturated power output. The work described in this report has been aimed primarily at reducing rf losses that occur in the input, since these losses add directly to the noise figure of the amplifier. These losses result from rf radiation at the pin seal, and from the insertion loss of presently available dc returns. The cathode coating has also been investigated. Two new cathode binder materials were evaluated with no significant effect upon noise figure of the amplifier. (Author)

AD-612 756 Div. 8, 26
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Electric Corp., Elkridge, Md.
IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL: TRANSISTOR (WX4001) LOGIC GATE (WM 201) FLIP-FLOP (WM 202) AC BINARY (WM 213).
Rept. for 1 Oct-31 Dec 64,
by A. T. Hamill. 31 Dec 64, 31p
Contract DA36 039AMC03617E Unclassified report

See also AD-609 445.
Descriptors: (*Transistors, Manufacturing methods), Microminiaturization (Electronics), Gates (Circuits), Relaxation oscillators, Silicon alloys, Epitaxial growth, Reliability (Electronics), Specifications, Quality control, Integrated circuits.

Numerous reliability tests begun in previous quarters were completed and extensive failure analyses were performed. Emphasis was placed upon failure analysis during the period, with most effort being placed on the WX 4001 device. The majority of the failures were thermally induced channels, followed by open bonds due to formation of purple plague at high temperatures in the step stress tests. The failure modes established confirmed the validity of the process improvements incorporated in present processing. The production run was begun during the period, and all fabrication was completed. Quarterly samples were delivered. The device specifications were finalized, and the Quality Control Manual was approved. The final Reliability Verification Plan is included as Appendix I. (Author)

AD-612 757 Div. 8
CFSTI Prices: HC$6.00 MF$1.50

Hughes Aircraft Co., Culver City, Calif.
INFORMATION THEORETIC EVALUATION OF NONLINEAR ANTENNA PROCESSING SYSTEMS
by G. O. Young and A. Ksienski. Dec 64, 260p
Scientific rept. no. SR-4, P64-131
Contract AF19 628 333, Proj. 4600, Task 460006
AFCRL 65-49

Unclassified report

See also AD-600 366.

Descriptors: (*Communication theory, Antennas), (*Antennas, Communication theory), (*Signals, Processing), Nonlinear systems, Integration, Decision theory, Monte Carlo method, Linear systems, Entrophy, Probability, Distribution, Transformations (Mathematics), Signal-to-noise ratio, Optimization.

Techniques have been developed for the evaluation of information rates in antenna processing systems which include nonlinearities. A general procedure is considered for finding the probability distributions of time-dependent variables which are filtered and which then undergo algebraic transformations. The nonlinear transformations include squaring and product operations. A prototype nonlinear processing antenna is presented and a procedure developed for evaluating the useful output entropy (information) for such an antenna. With this procedure, an information theoretic comparison of various signal processing systems can be made. Two principal numerical techniques suitable for digital computation of the entropy for nonlinear processing arrays are presented. The first directly simulates the antenna input process by the generation of random numbers. The computer then carries out the various operations which are involved in the antenna processing system. This technique has been applied to several examples and numerical results were obtained. The second method evaluates the information content directly by analytical techniques. In this method, Monte Carlo integration techniques are used to reduce computation time. (Author)

AD-612 775 Div. 8, 14, 17, 26
CFSTI Prices: HC$1.00 MF$0.50

Beryllium Corp., Reading, Pa.
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 64,
by J. F. Blum. 30 Sep 64, 25p
Contract DA36 039AMC01481E

Unclassified report

See also AD-609 686.

Descriptors: (*Ceramic materials, Electronic equipment), (*Beryllium compounds, Oxides), (*Electronic equipment, Ceramic materials), (*Powder metallurgy, Mechanical working), Powders, Sintering, Binders, Mixtures, Dielectric properties, Heat treatment, Density, Particle size, Microstructure, Tensile properties.

Dielectric properties were evaluated on specimens produced by various fabrication techniques. The average dielectric strength values for samples fired at 1560C were about 250 volts/mil. Gross differences were not noted as a function of fabrication technique. Dielectric constant and loss factor values were about 6.4 and 0.0007 respectively for as-sintered specimens. Machined samples showed an increased dielectric loss over the as-sintered specimens when measured following a water pretreatment as specified by MIL-I-10A. Firing temperature versus grain size studies on 99 per cent BeO compacts showed that average grain size ranged from about 13 microns at 1460C to 33 microns at 1560C. Average grain sizes were fairly constant in the firing temperature range 1510 - 1560C, but a significant change was noted at 1490C. Fired densities were about 97 per cent of theoretical from 1490 - 1560C. The fired density at 1460C was 96 per cent of theoretical. Flexural strength results showed a slight difference between test specimens prepared from fine and coarse grained samples with an average value of 26,900 psi for 13 micron material and 24,200 for 33 micron test specimens. However, the difference was not as large as anticipated and the results may be influenced more strongly by specimen preparation than by actual material differences. (Author)

AD-612 782 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF DESIGNING AMPLIFYING INSTRUMENT OF SHF AND ARRANGEMENT OF TRAVELING-WAVE TUBES FOR ACCOMPLISHING IT,
by V. A. Bunin and R. I. Raikhlin. 16 Mar 65, 6p
FTD-TT-64-558
TT 65-61842

Unclassified report

Unedited rough draft trans. of Russian patent 132724, appl. 651264/26, 18 Jan 60.

Descriptors: (*Amplifiers, Superhigh frequency), (*Dielectric amplifiers, Superhigh frequency), (*Traveling-wave tubes, Superconductors), (*Superconductors, Traveling-wave tubes), Design, Helium, Liquefied gases, Electric currents, Dielectrics, Patents, USSR.

Object of the Invention: (1) Method of designing amplifying instruments of superhigh frequency which are distinguished by the fact that for the purpose of increasing their period of service, instead of an electron beam for interaction with an electromagnetic wave, there is used a superconductor with a current. (2) A device of traveling-wave tubes for accomplishing the method described in paragraph (1), which is distinguished by the fact that in the center of the moderating system there is placed a superconductor in the form of a thin layer of metal on a dielectric tube cooled by liquid helium. (Author)

AD-612 789 Div. 8, 6
CFSTI Prices: HC$2.00 MF$0.50

Raytheon Co., Wayland, Mass. Advanced Development Lab.

NEWBURYPORT ANTENNA: TEST RESULTS.
Final rept. for Aug 62-Sep 64,
by John E. Walsh and Neil F. Lacey. 1 Dec 64,
33p
Contract AF19 628 496, Proj. 4600, Task 460002
AFCRL 64-987

Unclassified report

Descriptors: (*Multiple beam antennas, Performance (Engineering)), Dipole antennas, Antenna radiation patterns, Antenna lobes, Suppressors, Very high frequency, Airborne, Radar transmitters, Helicopters, Calibration, Experimental data, Flight testing.

The report contains results of some flight tests performed on the Newburyport Antenna, a 3500 foot, multiplicative, scanning array operating at 30-50 mcs and providing multiple receiving beams one-half degree wide in azimuth. Calibration and testing procedures are described, with particular reference to patterns taken by focusing in the near field. Test results were encouraging but not conclusive, and emphasize the existence of major difficulties in the assessment of characteristics of directive antennas at frequencies below UHF. (Author)

AD-612 798 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
UNSYMMETRICAL WAVEFORM THERMIONIC DIODE AND SYSTEMS STUDY,
by Joseph P. Angello. Jan 65, 30p
Technical rept. ECOM-2547
Proj. 1C6 22001A053, Task 1C6 22001A053 03

Unclassified report

Descriptors: (*Diodes, Thermionic converters), (*Thermionic converters, Cesium), (*Waveform generators, Thermionic converters), Electric power production, Power transformers, Pulse generators, Switching circuits, Voltage, Electrical impedance, Numerical analysis, Tests.

The operation of a pulsed, cesium vapor type thermionic diode is analyzed as an unsymmetrical waveform generator. The characteristics of the diode in this mode are investigated to determine the optimum duty cycle ratio of 'on-off' time, and to establish the requirements for the switching circuitry and power transformer. The system approach being taken, for raising the low voltage power of a diode to meet the impedance requirements of most equipment, may have advantages over a system employing a large number of diodes connected electrically in series. (Author)

AD-612 835 Div. 8

General Electric Co., Schenectady, N. Y.
STATISTICS OF SINGLE-ELECTRON MULTIPLICATION,
by G. C. Baldwin and S. I. Friedman. 30 Jul 64, 3p
Contract Nonr394200

Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v36 n1 p16-8 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electron multipliers, Effectiveness), (*Secondary emission, Measurement), Distribution theory, Photoelectrons, Pulse height analyzers, Photomultipliers.

Measurements of the pulse-height distribution from electron multipliers excited by single electrons are interpreted in terms of the Poisson statistics to give the secondary emission coefficient and detection efficiency. It is shown that silver-magnesium dynodes are characterized by a distribution of local values of the secondary emission coefficient. (Author)

AD-612 848 Div. 8

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CIRCULAR APERTURE SYNTHESIS.
Revised ed.,
by John Ruze. 18 May 64, 4p

Unclassified report

Pub. in I E E E Transactions on Antennas and Propagation (U. S.) vAP-12 n6 p691-4 Nov 1964 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 12 May 64.

Descriptors: (*Antenna radiation patterns, Synthesis), Beams (Electromagnetic), Antenna configurations, Integral transforms, Distribution theory, Series.

The linear aperture synthesis method of Woodward and Levinson is extended to a circular distribution. The extension includes circularly symmetric and nonsymmetric radiation patterns. The results are applicable to the design of reflector feeds and to electronically scanned arrays where a prescribed radiation pattern is desired. (Author)

AD-612 876 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

General Instrument Corp., Darlington, S. C. Capacitor Div.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVED RELIABILITY OF CAPACITORS, FIXED, SOLID ELECTROLYTE, TANTALUM HIGH-RELIABILITY 10MFD-20 VOLT CAPACITORS.
Quarterly rept. no. 4, 29 Mar-28 Jun 64,
by Floyd R. Banks, Jr. and A. DiGiacomo.
28 Jun 64, 21p
Contract DA36 039AMC03622E

Unclassified report

Descriptors: (*Tantalum capacitors, Manufacturing methods), (*Electrolytic capacitors, Manufacturing methods), Fixed capacitors, Production, Reliability (Electronics), Quality control, Processing, Binders, Sintering, Films, Pyrolysis, Coatings, Carbon, Silver, X-ray photography, Encapsulation, Performance (Engineering).

Work was performed in six areas of process improvement studies, and includes the initiation of a pre-Pilot Line Test Run; the areas are: (1) binder control; (2) pressing and sintering; (3) pressed density control; (4) pyrolytic conversion; (5) carbon and silver coating studies; and (6) X-ray analysis and encapsulation. The major results obtained were: (1) the variation in the average CV per gram for the several experimental pressing and sintering runs, using the BR-150 binder and binder ratio, was within five percent; (2) the average CV per gram for the pre-Pilot Line Test Run was fifteen percent lower than that obtained on the experimental runs, again using the BR-150 binder and binder ratio, but a different powder lot was used which had a different particle size distribution than that used for the experimental runs; (3) pressed density control data showed that the pressed densities obtained with the BR-150 binder were well within the control limits for both the Mean and the Range Control

Charts; and (4) capacitors fabricated with the carbon curing temperature twenty percent greater than the control curing temperature had, comparatively, a significantly lower average dissipation but not a significantly different average d-c leakage. (Author)

AD-612 890 Div. 8, 7
CFSTI Prices: HC$3.00 MF$0.75

Cinch Mfg. Co., Chicago, Ill. Research and Development Dept.
PRINTED CIRCUIT CONNECTORS FOR MICROASSEMBLIES (PHASE II).
Semi-annual progress rept. for 1 Jul 64-1 Jan 65, by Howard E. Dwan. 1 Jan 65, 66p
Contract DA28 043AMC00294E, Proj. 1P622001A057, Task 1P622001A05703

Unclassified report

Descriptors: (*Electric connectors, Printed circuits), (*Printed circuits, Microminiaturization (Electronics)), Fixed contacts, Design, Manufacturing methods, Electric insulation, Test methods, Resistance (Electrical), Vibration, Deflection, Shock (Mechanics), Salt spray tests, Thermal stresses, Hermetic seals, Encapsulation, Fastenings.

Progress on the three tasks comprizing this program is discussed. Task A: This task provides for the development of a twenty contact receptacle, which is 0.393 inches square and 0.115 inches high for use with the Micro-Circuit Module. Task B: This task provides for the development of a two-part 36-contact and an 80-contact connector for encapsulated stacked wafer assemblies of 0.310 inches square and 0.600 inches square microwafer based on the feasibility designs of DA-36-039-AMC-00122 (E). Task C: This task provides for the design, fabrication and evaluation of a connector for testing of individual micro-circuit wafers contained in the Micro-Circuit Module. A design has been accomplished and tooling is currently being fabricated. Details of the evaluation program are presented.

AD-612 893 Div. 8
CFSTI Prices: HC$5.00 MF$1.00

Stanford Research Inst., Menlo Park, Calif.
HIGH POWER MICROWAVE FILTERS FOR THE SUPPRESSION OF SPURIOUS ENERGY.
Final rept. for 15 Sep 63-14 Sep 64, by Leo Young, Edward G. Cristal, B. M. Schiffman, and D. B. Weller. Feb 65, 174p
Contract AF30 602 3147, Projs. 4540, 4657, Task 454003
RADC TR-64-515

Unclassified report

Descriptors: (*Radiofrequency filters, Suppressors), (*Suppressors, Radiofrequency filters), Coupling circuits, Low-pass filters, Band-pass filters, High-pass filters, Waveguides, Bolometers, Coaxial cables, Dielectrics, Resonators, Millimeter waves, Microwaves.

A new circuit for the 3-db short-slot sidewall coupler was tested as a harmonic pad. A new type of low-pass waveguide filter that attenuates by dissipation and has a very wide stop band is described. A 'trapped-mode' band-pass filter is described, in which the spurious responses due to higher-order resonances are eliminated by heavily damping all but the fundamental resonance, thus realizing a very wide stop band. A non-reflecting diplexer-type waveguide filter was synthesized, using two complementary filters, one band-pass filter and one band-stop filter. Numerical data are presented in graphical form on the characteristic impedance of coaxial lines consisting of a circular inner conductor and a rectangular outer conductor. Wire grid waveguide bolometers are shown to be similar to, but more stable and reproducible than, thin-film bolometers. The modes of a confocal resonator are found to be separable because of their unique transverse spatial distribution so that, despite a high degree of mode degeneracy, high-power millimeter-wave filters appear realizable. Low-pass and high-pass filters can be built at millimeter wave frequencies using stacks of dielectric plates. A multi-harmonic rejection filter, has been designed by an exact method.

AD-612 903 Div. 8, 25
CFSTI Prices: HC$4.00 MF$0.75

Airborne Instruments Lab., Deer Park, N. Y.
ELECTRONICALLY STEERABLE FIELD REFLECTOR TECHNIQUES.
Final rept., by C. J. Wilson. Feb 65, 111p
Rept. no. AIL-2732-1
Contract AF30 602 3335, Proj. 4506, Task 450604
RADC TR-64-521

Unclassified report

Descriptors: (*Antennas, Reflectors), (*Reflectors, Antennas), Theory, Antenna feeds, Antenna radiation patterns, Parabolic bodies, Mathematical analysis, Programming (Computers).

A theoretical study of antenna systems consisting of two concave reflectors illuminated by an appropriately shaped cluster of feeds so arranged that the aperture blocking usually caused by the secondary reflector is eliminated has been conducted using a digital computer. The size, contour, and position of the cluster feed surface has been investigated in relation to different shaped field reflectors as the sizes and positions of the field reflectors are varied. The radiation patterns of several field reflector configurations for boresight and off-axis operation are included and the field reflector system is shown to maintain a higher peak power than a comparable offset cluster when scanned. There is no deterioration of pattern quality in the field reflector system. The field reflector system is shown to be capable of correcting for considerable distortion of various types. An example of the sum and difference patterns formed by the field reflector system is illustrated. Successive beam-broadening is shown, with a factor of 3.88 obtained from an 11-feed field reflector system. (Author)

AD-612 909 Div. 8, 5, 30
CFSTI Prices: HC$4.00 MF$1.00

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
SIGNAL DESIGN TECHNIQUES. VOLUME I: A TUTORIAL OVERVIEW OF THE FINAL TECHNICAL REPORT ON CONTRACT AF33(657)-10709. VOLUME II: LEARNING IN SINGLE AND TWO THRESHOLD DECISION MAKING SYSTEMS.
Rept. for Feb 63-Dec 64, by J. C. Hancock, J. C. Lindenlaub, and D. F. Mix. Feb 65, 126p
Contract AF33 657 10709, Proj. 4335, Task 433529
AL TR-65-12 V1 and 2

Unclassified report

This document consists of Volumes I and II of a five volume rept. entitled 'Signal Design Techniques.' Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Communication theory, Digital systems), (*Artificial intelligence, Communication theory), (*Learning, Artificial intelligence), (*Decision making, Artificial intelligence), Communication systems, Communication equipment, Optimization, Statistical analysis, Errors, Reduction, Pattern recognition, Data processing systems, Models (Simulations), Signals.

Volume I: The first chapter of this volume contains general definitions of digital communication systems and statistical communication theory -- the main research subject around which the following four volumes are built. Chapter 2 is an introductory and summarizing description of 'Learning Theory,' details on the research of which are contained in Volume II. Chapter 3 is a summarization of Volume III on 'Certain Optimum Waveforms for Channels with Memory' which discusses the signal design problem with memory. Chapter 4 is a discussion of the research involved in Volume IV on 'Distribution-Free Detection Procedures'. Chapter 5 involves the discussion of the 'Performance of Easily Implemented Error Reduction Techniques,' reported on in detail in Volume V. This work is concerned with an experimental study of four learning systems.

AD-612 910 Div. 8, 5
CFSTI Prices: HC$4.00 MF$1.00

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
SIGNAL DESIGN TECHNIQUES. VOLUME III. CERTAIN OPTIMUM SIGNALING WAVEFORMS FOR CHANNELS WITH MEMORY.
Rept. for Feb 63-Dec 64,
by J. C. Hancock and H. Schwarzlander. Feb 65, 126p
Contract AF33 657 10709, Proj. 4335, Task 433529
AL TR-65-12 V 3

Unclassified report

This document consists of Volume III of a five volume rept. entitled 'Signal Design Techniques.'
See also AD-612 909.

Descriptors: (*Communication theory, Digital systems), Optimization, Signals, Waveform generators, Linear systems, Functions, Signal-to-noise ratio, Wave transmission, Communication systems, Statistical analysis.

In this report, certain optimum signaling schemes for digital communication over channels with memory are investigated. The channel is assumed to consist of a linear system with a rational transfer function followed by a source of additive white gaussian noise. Assuming binary transmission of equally likely signals and fixed average transmitter power, the probability of received errors is minimized for an arbitrary fixed signaling rate by selection of the best waveshape out of all those input signals which yield intersymbol interference-free waveforms at the channel output. It is then shown that an increase in signal alphabet size reduces the error probability, on the basis of equal rate comparison.

AD-612 911 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Eitel-McCullough, Inc., San Carlos, Calif.
HIGH POWER X-BAND GENERATOR.
Quarterly rept. no. 8, 1 Jul-30 Sep 64,
by William R. Luebke and Tore Wessel-Berg.
30 Nov 64, 39p
Contract AF30 602 2756, Proj. 5573, Task 557303
RADC TR-65-14

Unclassified report

Also see AD-607 261.

Descriptors: (*Microwave amplifiers, X band), (*Klystrons, Microwave amplifiers), (*Waveguides, Design), Power amplifiers, Radar transmitters, Electron tubes, Waveguide windows, Performance (Engineering), Circuits, Transmission lines, Electron beams, Theory, Mathematical analysis.

The purpose of this program is to develop a klystron amplifier operating at 8 kMc and delivering one megawatt of CW power. After its four-hour acceptance test at the 110 kilowatt average power level, the second long pulse tube was operated CW at 350 kilowatts. Waterload arcing prevented stable operation but no damage to the tube occurred. The first of the multi-port tubes was processed and placed on initial test at low average power. Several additional transmission windowtrons were fabricated and tested. An analysis of power flow in coupled-cavities is presented. (Author)

AD-612 919 Div. 8, 22
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
FIELD INTENSITY EFFICIENCY OF VEHICULAR ANTENNA AT-912(XE-2)/VRC,
by Watson P. Czerwinski. Mar 64, 14p
Test rept. no. USAELRDL-TR-1564
Proj. 1A010501B010

Unclassified report

Descriptors: (*Ground vehicle antennas, Performance (Engineering), (*Radio fields, Ground vehicle antennas), Dipole antennas, Very high frequency, Intensity, Measurement, Gain, Effectiveness, Armored vehicles.

Field intensity measurements of Antenna AT-912(XE-2)/VRC, also known as 'Improved Center-Fed Whip', are compared to measurements of a half-wave, sleeve type, vertical dipole cut to the test frequency. Each antenna, in turn, was mounted on a 3/4-ton weapons carrier vehicle. As pattern circularity was confirmed by other tests, only head-on readings were taken. The Center-Fed Whip Antenna was found to have at least the same gain as the 'unity-gain antennas' throughout the operating range of 30 to 76 mc. (Author)

AD-612 930 Div. 8, 25
CFSTI Prices: HC$4.00 MF$1.00

Sperry Microwave Electronics Co., Clearwater, Fla.
DEVELOPMENT OF ADVANCED MICROWAVE COMPONENTS AND TECHNIQUES, PLANAR HEXAGONAL FERRITES AND DEVICES,
Final rept.
Feb 65, 118p
Contract AF30 602 2757, Proj. 4506, Task 450602
RADC TDR-64-432

Unclassified report

See also AD-602 835.

Descriptors: (*Ferrites, Dielectric properties), (*Microwave equipment, Ferrites), Barium compounds, Oxides, Zinc compounds, Iron compounds, Manganese compounds, Nickel compounds, Copper compounds, Cobalt compounds, Aluminum compounds, Garnet, Waveguides, Yttrium compounds, Anisotropy, Density, Magnetic properties, Magnetic resonance, Hysteresis, Phase shifters, Electronic switches, X band, C band, S band.

Material parameters and methods of preparation of a series of Y-compounds are reported. The high dielectric loss measured in the planar hexagonal ferrites is a limitation on performance of the material in most microwave

devices. While an intense program was conducted to minimize dielectric loss, the lowest dielectric loss measured at X-band frequencies on a variety of Y-compositions with differing iron stoichiometry and preparation techniques was 0.01. The inferior characteristics of the planar materials make them less desirable for use in microwave devices than other ferrite materials. Measurements and analyses of the applications of planar hexagonal ferrites in isolators and differential phase shifters are reported. Both theoretical analysis and experimental results strongly indicate that in most microwave devices no improvement in device performance can be obtained by utilizing planar hexagonal ferrites in preference to other ferrite materials. A study of grain orientation in cubic ferrites is also reported. X-ray diffraction studies of nickel ferrite pressed in the presence of a dc magnetic field have shown positive evidence of crystallite orientation. Narrowest X-band linewidth measured on this partially oriented nickel ferrite is 268 oe.

AD-612 933 Div. 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Varian Associates, Beverly, Mass.
THALLIUM BEAM TUBE RESEARCH,
Quarterly progress rept. no. 2, 1 Oct-31 Dec 64,
by Richard F. Lacey. 31 Dec 64, 22p
Contract DA28 043AMC00350E, Proj. 1P6 22001A058
Unclassified report

Descriptors: (*Thallium, Beam power tubes), (*Beam power tubes, Thallium), (*Ionization, Molecular beams), Surfaces, Work functions, Ionic currents, Iridium, Tungsten, Electron optics, Cavity resonators, Wire, Microwave frequency, X band, Magnets, Electron multiplier, Particle beams.

Several hot wire ionizers were tested, including oxidized and carbonized tungsten and iridium. Tests up to now fail to confirm the large ionization efficiency of iridium for thallium reported by Shipley. No ionizers of reasonable efficiency have yet been found except for the well-known oxidized tungsten hot wire ionizer. A test cylindrical cavity whose central rod is supported by an uncoated quartz continuation has been designed. A prototype quadrupole magnet has been designed and ordered. Beam optics calculations have been completed. (Author)

AD-612 935 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPHERICAL ANTENNA CORRECTED BY A SUB-REFLECTOR,
by Lyle C. Purdum. Sep 63, 42p
Rept. no. 6-90-63-90
Unclassified report

Technical rept. on Communications.

Descriptors: (*Conical antennas, Antenna radiation patterns), Performance (Engineering), Spheres, Focusing, Reflectors, Antenna feeds, Mathematical models, Diffraction, Radio beams.

It is demonstrated that, in the regions investigated, a spherical antenna corrected by a sub-reflector can be represented by a purely mathematical model base on the aperture-field method. The use of this model resulted in IBM 7090 programs which can be used to predict diffraction patterns for specified antenna system configurations within the accuracy of experimental data at present available. (Author)

AD-612 954 Div. 8, 25
CFSTI Prices: HC$4.00 MF$1.00

Microwave Device and Physical Electronics Lab., Univ. of Utah, Salt Lake City.
MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LABORATORY CONSOLIDATED QUARTERLY REPORT FOR THE PERIOD OCTOBER 1, 1964 TO DECEMBER 31, 1964.
31 Dec 64, 127p Technical rept. MDL-Q11
Contracts Nonr128805, AF04 693 439
Unclassified report

See also AD-609 934.

Descriptors: (*Electronics, Electromagnetic waves), (*Electromagnetic waves, Frequency), (*Frequency, Electromagnetic waves), (*Lasers, Electronics), (*Plasma physics, Electronics), (*Electron beams, Microwave equipment), Backward wave oscillators, Dielectrics, Cyclotron waves, Circuits, Microwave amplifiers, Wave guides, Light, Tunneling (Electronics), Quantum mechanics, Masers, Millimeter waves, Plasma medium, Rocket motors, Exhaust gases, Superconductivity, Semiconductor devices, Mathematical analysis, Partial differential equations, Propagation, Microwave frequency.

Contents: A 36-40 kMc Multiple-ladder circuit backward-wave oscillator; Dielectric slow-wave circuits; Rotating beam devices; Cyclotron-wave device; Multiple-beam interactions; Magneto-electric beam compression; Transverse beam waves; A two-millimeter backward-wave oscillator; Microwave power converter; Irradiated laser materials; Tunneling studies; Millimeter wave masers; Gas laser studies; Waves in plasmas; Plasma generation and measurements; Plasma for a coupling medium; Rocket exhaust studies; Superconductivity.

AD-612 965 Div. 8
CFSTI Prices: HC$3.00 MF$0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
WAVES GUIDED BY A BOUNDARY WITH TIME-SPACE PERIODIC MODULATION,
by Edward S. Cassedy. 22 Jan 65, 52p
Research rept. no. PIBMRI-1251-65
Contracts AF19 604 7499, AF19 628 4324,
Proj. 4600, Task 460004
AFCRL 65-116
Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), Wave transmission, Boundary value problems, Electromagnetism, Antenna radiation patterns, Parametric amplifiers, Nonlinear systems, Waveguides, Modulation.

Electromagnetic waves guided by a plane surface impedance which is modulated periodically in time and space in the traveling-wave sense are considered. The problem treated is a linearized statement of the nonlinear parametric interaction of waves on an open wave guide structure. In this linear treatment the rigorous approach formerly used on (purely spatial) periodic structures is taken. Parametric wave interactions of both the stable and the (potentially) unstable type are examined. The regions of operation for bound surface waves, as opposed to (radiating) leaky waves are determined rigorously for this structure. A region of operation called herein the 'sonic' region is found which represents a form of an electromagnetic shock wave. This sonic regions precludes, for the model chosen, the possibility of traveling-wave amplification along the length of the structure. The above mentioned results are forthcoming

only from the complete treatment, including the effects of all time-space harmonics, carried out below. Finally, the power mixing principle for all harmonic waves is determined to be the Manley-Rowe power-frequency relation applied at the boundary surface. (Author)

AD-613 011 Div. 8, 1, 12
CFSTI Prices: HC$1.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
RADIATION AND RECEPTION OF ELECTROMAGNETIC ENERGY FROM AIRCRAFT AND GUIDED MISSILES.
Final rept. for Feb 62-Sep 64,
by Joseph E. Nanevicz. Oct 64, 25p
Contract AF19 628 325, Projs. 4600, 3977,
Task 460001
AFCRL 64-891

Unclassified report

Descriptors: (*Guided missile antennas, Scientific research), (*Aircraft antennas, Scientific research), Reports, Voltage, Attenuation, Measurement, Plasma physics, Electron density, Radiofrequency interference, Atmospheric percipitation, Raindrops, Electric discharges, Electromagnetic waves, Propagation.

The report gives descriptions of the various investigations undertaken on the research program conducted on missile and aircraft antennas from February 1962 through September 1964. These investigations are grouped under three general categories: The Effects of Antenna Environment upon its Performance, Experimental Studies, and Studies Related to Antenna Systems. The relationship of this work to other work at Stanford Research Institute and to the aircraft and missile antenna development program of the Air Force is briefly discussed. The report includes a list of the technical reports published on the contract. (Author)

AD-613 029 Div. 8, 26

Weston Instruments, Inc., Newark, N. J.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-127 AND MIL-R-22097B (MODIFIED).
Quarterly progress rept. no. 10, 1 Oct-31 Dec 64,
by Harold R. Hux, Edward G. Gruss, Charles L. Parry, Joseph Sterchak, and Joseph J. Spalluto.
31 Dec 64, 69p.
Contract DA36 039SC86734

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.
See also AD-609 313.

Descriptors: (*Variable resistors, Manufacturing methods), Metal films, Resistance (Electrical), Failure (Mechanics), Life expectancy, Performance (Engineering), Electric insulation, Tests.

Preproduction potentiometers of 200 ohms, 1K ohms, 25K ohms, 50K ohms and 200K ohms were tested. Molded insulator parts made from either Fibrite no. 8492 or Mitchell-Rand no. 7034 were found to be most satisfactory in the potentiometer assemblies. A 12-cavity mold has been built for limited processing of these parts in the house. New toroid contact springs with a new satisfactory cross section area have been received and installed in a limited number of potnetiometers. New 302 stainless steel clutch idle springs were received and a quantity of potentiometers were assembled using these springs. Preliminary results indicate the stainless steel springs to have excessive compression for toroid potentiometer operation by preventing (in a percentage of cases) the contact spring carrier from fully disengaging the drive screw causing the contact spring to revolve within the assembly near the clutch position giving rise to possible excessive wear of the resistive element in this position.

AD-613 033 Div. 8, 30
CFSTI Prices: HC$2.00 MF$0.50

Hyletronics Corp., Burlington, Mass.
THE DEVELOPMENT OF BROADBAND DIGITAL PHASE SHIFTING NETWORKS USING SEMICONDUCTOR SWITCHES.
Interim development rept. for 5 Nov 64-5 Feb 65,
2 Mar 65, 26p
Contract NObsr91300, Proj. SR0080302, Task 9637

Unclassified report

Descriptors: (*Phase shifters, Broadband), (*Diodes (Semiconductor), Electronic switches), Real time, Digital systems, Microwave networks, Delay lines, Switching circuits, Design.

The report covers the work performed during the first quarterly period of this contract. The initial designs of components required for 4-bit phase shifters were fabricated and tested. The components required in the design of the 4-bit time delay phase shifter were completed and applied to the final assembly. The preparation of the photographic negative of the unit is complete. The real time delay phase shifter will be fabricated and tested during the final period of this program. The components of the phase delay shifter will also be completed and incorporated into a single microwave printed circuit during this period. (Author)

AD-613 036 Div. 8, 25
CFSTI Prices: HC$4.00 MF$0.75

General Electric Co., Syracuse, N. Y.
FAILURE MECHANISMS AT SURFACES AND INTERFACES.
Final rept. for 1 Jul 63-1Aug 64,
by K. K. Reinhartz, V. A. Russell, D. L. Stockman, W. J. van der Grinten, and W. L. Willis. Feb 65,
112p
Contract AF30 602 3085, Proj. 5519, Task 551906
RADC TDR64 454

Unclassified report

See also AD-604 349.

Descriptors: (*Semiconducting films, Surface properties), (*Semiconductor devices, Reliability (Electronics)), (*Failure (Mechanics), Semiconducting films), Transistors, Stresses, Storage, Aging (Materials), Voltage, Degradation, Controlled atmospheres, Electrical properties, Temperature, Surfaces, Humidity, Gates (Circuits), Glass capacitors, Dielectrics, Cadmium compounds, Sulfides, Selenium, Silicon compounds, Oxides.

A study of the aging and failure characteristics of thin film field effect triodes was carried out. Techniques for applying stress to the sample devices under controlled conditions were developed and the resulting changes of the characteristics were measured. Samples stored under dry argon at 30C remained stable after 1 year. An increase of the humidity to 30% caused a decrease of the threshold voltage. During storage at a constant temperature from 50C to 122C, the threshold voltage increased reaching a stable value within a few days. During d.c. electrical stress the threshold voltage either decreased or increased reaching a stable value at constant gate voltage after a few hundred hours. These

different failure modes under electrical stress could be correlated with differences in the slow relaxation characteristic of the field effect conductivity which in turn was traced to the treatment of the semiconductor surface during device fabrication. The threshold voltage was the only parameter which appeared to be changing appreciably indicating that the changes were occurring at the semiconductor-insulator interface. (Author)

AD-613 044 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS.
Quarterly progress rept. no. 10, 1 Dec 64-28 Feb 65, by James Rippin. Mar 65, 57p
Contract AF33 657 10474, Projs. 6278, 4028, Tasks 6278 01, 4028 24
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Antennas, Scientific research), Log periodic antennas, Slot antennas, Dipole antennas, Coupled antennas, Helical antennas, Spiral antennas, Ominidirectional antennas, Wave transmission, Amplifiers, Conical antennas, Transmission lines, Antenna feeds, Waveguides, Electromagnetic waves, Propagation.

Topics include: radiation from periodic structures, log-periodic covity-backed slot antennas, log-periodic magnetic current antennas, log-periodic zigzag antennas, logarithmic spiral antennas, multi-arm logarithmic spiral antennas, integrated antenna amplifier, wave propagation along helical conductors, investigation of periodic structures, investigation of a class of log-periodic structures, radiation lens illuminated from a goubau beam-waveguide, radiation from circular waveguides, omnidirectional and steerable beam antenna development at millimeter wavelengths, millimeter antenna test instrumentation, and components for millimeter wave antennas.

AD-613 048 Div. 8, 2
CFSTI Prices: HC$3.00 MF$0.75

Raytheon Co., Wayland, Mass.
SYSTEMS ANALYSIS AND ADDITIONAL INSTRUMENTATION FOR MODIFIED 'PORCUPINE' C-BAND PULSE DOPPLER RADAR.
Final rept. for 1 Sep 63-31 Oct 64, by Frederick E. Compton, Herbert L. Groginsky, and Edward G. Cox. Nov 64, 79p
Contract AF19 628 494, Proj. 6672, Task 667204
AFCRL 64-985
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Doppler radar, Sensitivity), C-band, Meteorological radar, Meteorological parameters, Signal-to-noise ratio, Narrowband, Filters (Electromagnetic wave), Radar echo areas, Statistical analysis, Antenna radiation patterns, Systems engineering.

Section one of this report contains systems analysis work performed in two areas. The first work is a mathematical analysis of the zero crossing counter performance by Dr. Herbert L. Groginsky. The second work is a theoretical short range sensitivity analysis by Edward G. Cox. Section two contains procedures and results of a VSWR and a high power test performed on the Porcupine Antenna System. Section three contains documentation for the more significant circuits and displays which were implemented during the period of this report. (Author)

AD-613 059 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS.
Quarterly progress rept no. 9, 1 Sep-30 Nov 64, by James Rippin. Mar 65, 70p
Contract AF33 657 10474, Projs. 6278, 4028, Tasks 6278 01, 4028 24
Unclassified report

See also: AD-610 707.

Descriptors: (*Antennas, Reports), Log periodic antennas, Slot antennas, Spiral antennas, Helical antennas, Omnidirectional antennas, Conical antennas, Biconical antennas, Amplifiers, Propagation, Waveguides, Millimeter waves, Wave transmission, Antenna radiation patterns, Tunnel diodes, Electrical impedance, Mathematical models.

Contents:
Radiation from periodic structures
Log-periodic cavity-backed slot antenna
Log-periodic magnetic current antenna
Log-periodic zigzag antenna
Logarithmic spiral antenna
Multi-arm logarithmic spiral antenna
An integral antenna amplifier
Wave propagation along helical conductors
Investigations of periodic structures
Investigations of a class of log-periodic structures
Radiation lens illuminated from a Goubau waveguide
Radiation from circular waveguides
Omnidirectional and steerable beam antenna development at millimeter wavelengths
Millimeter antenna test instrumentation
Components for millimeter wave antennas.

AD-613 064 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

General Bronze Corp., Garden City, N. Y.
DEVELOPMENTAL PROGRAM FOR THE FABRICATION AND TESTING OF LIGHTWEIGHT WAVEGUIDE.
Engineering rept., phase 2, 8 Aug 64-15 Mar 65, by G. Doundoulakis, F. Barth, and J. Millery.
15 Mar 65, 19p
Contract NObsr85320, Proj. SR0080302, Tasks 9597, A
Unclassified report

See also AD-603 771.

Descriptors: (*Waveguides, Design), Weight, Helixes, Mechanical drawings, Waveguide bends, Waveguide couplers, Dipole antennas, Laminated plastics, Metal coatings, Transmission lines, S band, Stand wave ratios, Electrical properties.

This report covers studies performed to fabricate various models to establish sufficient design data for the fabrication of 96 in lightweight serpentine waveguide structures. A single convolution of a serpentine waveguide was simulated and tested. Testing revealed the presence of higher modes

than the fundamental TE(g), mode; such transmission would have a deleterious effect on the array pattern. A new configuration in the form of uniform helical waveguide is presented as the possible answer in the electronically steerable arrays. A lightweight model of a serpentine section described by AGA drawing C612-026 and B612-003 was accomplished. (Author)

AD-613 068 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

Crystalonics, Inc., Cambridge, Mass.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600 SERIES FIELD EFFECT TRANSISTORS.
Quarterly rept. no. 6, 1 Oct-31 Dec 64,
by John R. Williams. 31 Dec 64, 25p
Contract DA36 039AMC01483E

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-609 596.

Descriptors: (*Transistors, Manufacturing methods), (*Reliability (Electronics), Transistors), Silicon, Processing, Boron, Phosphorous, Diffusion, Chemical milling, Etched crystals, Bonding, Tests, Data processing systems, Packaging, Quality control.

The purpose of this program is to improve the reliability of the C600 series field effect transistors by specific improvements of manufacturing techniques. The basic program has been outlined in a PERT plan which is being used as a reference. In an effort to achieve the failure rate objective, the following processes are to be improved: (1) Oxidation of slices; (2) Boron diffusion of slices; (3) Mask alignment; (4) Etching of slices; (5) Die-to-header bonding; (6) Wire bonding; (7) Packaging. (Author)

AD-613 069 Div. 8
CFSTI Prices: HC$5.00 MF$1.00

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
SIGNAL DESIGN TECHNIQUES. VOLUME IV. DISTRIBUTION-FREE DETECTION PROCEDURES.
Rept. for Feb 63-Dec 64,
by J. C. Hancock and D. G. Lainiotis. Feb 65, 151p
Contract AF33 657 10709, Proj. 4335, Task 433529
AL TR-65-12 V4

Unclassified report

Descriptors: (*Radio signals, Demodulation), (*Communication theory, Decoding), Demodulators, Signal-to-noise ratio, Statistical tests, Statistical functions, Digital systems, Probability, Design.

A class of two-input detection systems for digital communication over random and unknown channels is investigated. The systems investigated possess false-alarm rates which are invariant for wide classes of channel statistics. Specifically, coincidence detection procedures with invariant or distribution-free false-alarm rates are proposed and investigated. The only information concerning the channel statistics which is required by these detectors is the median of the noise under no-signal conditions. The coincidence procedures are subsequently modified so that the detectors utilizing them become either learning systems with respect to slowly time-varying and/or unknown location parameters or adaptive systems with respect to rapidly varying and/or unknown location parameters. The classes of detection problems for which the false-alarm rates of the above procedures detectors remain distribution-free are also obtained. In addition to the distribution-free coincidence detectors, a detector based on the T-statistic, and well suited for the detection of stochastic signals in noise, is proposed and investigated. The T-statistic is then modified so that the detector utilizing it becomes an adaptive system with respect to rapidly varying and/or unknown location parameters. The wide classes of detection problems for which the above detectors remain distirbution-free are also obtained. The distribution-free detectors are then applied to various practical detection problems, and their performances are evaluated and compared to the performances of comparable likelihood detectors. (Author)

AD-613 070 Div. 8
CFSTI Prices: HC$5.00 MF$1.00

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
SIGNAL DESIGN TECHNIQUES. VOLUME V. PERFORMANCE OF EASILY IMPLEMENTED ERROR REDUCTION TECHNIQUES.
Rept. for Feb 63-Dec 64,
by J. C. Hancock and R. G. Marquart. Feb 65, 170p
Contract AF33 657 10709, Proj. 4335, Task 433529
AL TR-65-12 V5

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-612 909.

Descriptors: (*Radio signals, Design), (*Communication theory, Coding), (*Errors, Corrections), Radio communication systems, Radio reception, Feedback.

Several techniques designed to reduce the probability of error in the transmission of digital data are evaluated. Three coding techniques are investigated, and the per-limit error probability at the decoder output, as a function of that at its input, is obtained for each of the three. The three codes are the Hamming SEC code and the Wagner code (both considered as forward error correcting techniques and as error detection methods for a repeat-request system) and the Hamming DED code, which is additionally analyzed when operating in a partial error correcting, partial repeat-request mode. Finally, the merit and, where applicable, the required feedback channel capacity are computed and presented graphically. Two reception techniques are also investigated. The first of these techniques is the null zone system; each transmission of a limit results in a simple accept-or-reject decision by the receiver and in retransmission until acceptance is obtained. The second technique, which is first postulated in this study, is essentially a time-quantized version of sequential reception and is, therefore, termed a 'pseudo-sequential' system. (Author)

AD-613 072 Div. 8
CFSTI Prices: HC$4.00 MF$0.75

American Electronic Labs., Inc., Colmar, Pa.
FUTURE RECEIVER CONTROL TECHNIQUES.
Final rept.,
by J. Waitkeneus, M. Sonstein, L. Tuttle, A. Brault, and A. D'Ambrisi. Feb 65, 101p Rept. no. 63096-5
Contract AF30 602 3187, Proj. 4540, Task 454003
RADC TDR-64-493

Unclassified report

Descriptors: (*Radiofrequency interference, Suppressors), (*Suppressors, Radiofrequency interference), Radio receivers, Noise (Radio), Reduction, Very high frequency, Ultrahigh frequency, Band-pass filters, Resonators, Dielectrics, Antennas.

A number of experimental component and circuit techniques which are applicable in reducing the effects of high level interference on receivers have been developed and evaluated. An experimental receiver covering the frequency range 225-400 Mc, incorporting many new RFI reduction techniques has also been developed. Areas of research included a band reject filter, capacitor and voltage tuned helical resonators, signal phase cancellation techniques, receiver designs and antenna techniques. The band reject filter and phase cancellation device were designed to be compatible with the R-361A communications receiver and the experimental receiver. The hollow, dielectric rod antenna was developed and investigated as a new approach for control of beam widths and angular location of pattern nulls. Modifications were also incorporated in the R-361A receiver to make it less susceptible to adjacent and to co-channel interference. (Author)

AD-613 078 Div. 8, 6
CFSTI Prices: HC$2.00 MF$0.50

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
A TWO-STAGE LIKELIHOOD-RATIO DETECTION PROCEDURE FOR AN UNKNOWN WAVEFORM WHICH IS RANDOMLY REPEATING IN NOISE.
Final rept.,
by Melvin J. Hinich. Feb 65, 28p
Management sciences research rept. no. MSRR-35
Contract Nonr76024, Proj. NR047 048
Unclassified report

Descriptors: (*Electromagnetic waves, Demodulation), (*Signals, Wave transmission), (*Communication theory, Signals), Stochastic processes, Signal-to-noise ratio, Statistical functions, Mathematical analysis, Errors, Geometric forms.

Suppose we have a stochastic process which is made up of an unknown waveform of finite duration, which is repeated randomly in Gaussian noise with a known covariance function. The rate of recurrence of the waveform is a known constant, and the signal-to-noise ratio of the waveform in the noise is small. A two-stage procedure is developed for detecting the epochs of the waveform based upon efficient large-sample estimates of the autocorrelation of the waveform. The error probabilities are given for this procedure which is based upon approximation of the likelihood-ratio. A bound for the error due to the approximation of the likelihood function is given. (Author)

AD-613 091 Div. 8, 25

Columbia Radiation Lab., New York.
A FIELD-INDEPENDENT OPTICALLY PUMPED Rb87 MASER OSCILLATOR,
by P. Davidovits and W. A. Stern. 18 Nov 64,
3p Technical rept. no. TR-1
Contract Nonr425910, Proj. NR373 250
Unclassified report

Pub. in Applied Physics Letters (U. S.) v6 n1 p20-1 1 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Microwave oscillators, Masers), (*Masers, Microwave oscillators), Rubidium, Pumping (Electronics), Magnetic properties, Frequency stabilizers, Radiofrequency power, X band.

Oscillation at 6835 Mc/sec has been obtained between the 5(2)S(1/2)(F = 2, m = 0) and 5(2)S(1/2) (F = 1, m = 0) levels of Rb87 in a magnetically unshielded optically pumped maser. The realization of oscillation on the field-independent transition greatly relaxes the requirements on the ambient magnetic field. For example, the maser will oscillate in the presence of a magnetic field inhomogeneneity as large as 10 mG with a total field of 1G. The sensitivity to ambient ac field has been greatly reduced, and the frequency and amplitude stability of the system have been improved. Furthermore, the oscillator frequency may be Zeeman tuned over a minimum range of 100 kc/sec with a field homogeneous to 1 part in 10000 or better.

9. Fluid Mechanics

AD-612 482 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Hydronautics, Inc., Laurel, Md.
COLLAPSE OF TURBULENT WAKES IN DENSITY-STRATIFIED MEDIA,
by Jin Wu. Jan 65, 47p Technical rept. no. TR-231-4
Contract Nonr368800, Proj. NR220 016
Unclassified report

Descriptors: (*Wake, Degradation), (*Gravity, Hydrodynamics), Density, Turbulence, Two-dimensional flow, Boundary layer, Laminar flow, Oceanology, Underwater objects, Mathematical models.

The wake generated by a submerged body moving through a density-stratified medium consists not only of a region of turbulence but also of a region of water with homogeneous density. The purpose of the present research is to study phenomena and modeling criteria relating to the collapse of this wake. Since the wake is very slender in the direction of the body passage, this problem is simplified by studying only the collapse of a particular transverse section of the wake. An experimental technique was successfully developed by using a wall-mixer to model the collapsing phenomen of a two-dimensional wake in density-stratified media. The process of collapse can be divided into three stages: 'initial', 'principal' and 'final' collapse stages. Empirical formulae were derived to describe the collapse processes of the first two stages, during which the gravitational effect is found to be the predominant modeling criterion. The collapsing process in the final stage was complicated by the increasing viscous effect and observed mixing at the thin wake tip. (Author)

AD-612 606 Div. 9, 4, 2
CFSTI Prices: HC$1.00 MF$0.50

Yale Univ., New Haven, Conn.
EFFECTS OF SEEDING ON THE CONDENSATION OF ATMOSPHERIC MOISTURE IN NOZZLES.
Rept. no. 5,
by E. R. Buckle and A. A. Pouring. Feb 65, 16p
Contract Nonr60947
Unclassified report

See also AD-444 547.

Descriptors: (*Humidity, Condensation), (*Atmosphere, Humidity), (*Condensation, Humidity), (*Nucleation, Condensation), Smokes, Inorganic compounds, Particles, Moisture, Air, Fluid flow, Wind tunnels, Nozzles.

When smoke particles of certain inorganic compounds are added to moist air expanding at near sonic speeds in the wind tunnel, they act as heterogeneous nuclei for the condensation of water. Unlike homogeneous condensation, which commences later in the expansion and is characterized by a hump in the static pressure distribution, heterogeneous condensation is so gradual that while it occurs the static pressure values are indistinguishable from those in a dry air expansion. Nevertheless, when the initial humidity exceeds a certain level determined by the flow conditions and the smoke concentration, heterogeneous condensation becomes sufficiently rapid to affect the local humidity, and homogeneous condensation is partially suppressed. This seeding effect can be used to eliminate normal shocks resulting from homogeneous condensation. Since it requires upwards of 10 to the 8th power particles/cc, the effect is not shown by the foreign nuclei naturally present in the atmosphere. (Author)

AD-612 672 Div. 9, 31
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Ships, Washington, D. C.
A PRELIMINARY HYDROFOIL DESIGN INCORPORATING A CAVITATION FREE OPERATION REQUIREMENT,
by William D. Bauman. Dec 64, 34p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
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Descriptors: (*Hydrofoils, Design), (*Cavitation, Inhibition), Specifications, Hydrodynamic configurations, Nacelles, Hydrofoil boats, Gas turbines, Operation.

AD-612 758 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SEPARATED FLOW STUDIES AT HYPERSONIC SPEEDS. PART I. SEPARATED FLOWS OVER AXISYMMETRIC SPIKED BODIES,
by Michael Holden. Dec 64, 43p
Rept. no. CAL-AF-1285-A-13 (I)
Contract Nonr265300
Unclassified report

Descriptors: (*Hypersonic flow, Separation), (*Spikes, Laminar flow), (*Heat transfer, Aerodynamic configurations), (*Aerodynamic heating, Reduction), Axially symmetric flow, Cylindrical bodies, Conical bodies, Schlieren photography.

One objective of the report was to obtain detailed information on the heat transfer generated in the reattachment region of a conical shear layer, and determine the influence of reattachment angle, free stream Mach number and downstream expansion on this phenomena. A second objective was to make a systematic study of the parameters which influence the protection of aerodynamic surfaces by means of spiked induced separated flows. The parameters varied were spike length, body shape and free stream Mach number. Measurements of the distribution of heat transfer together with schlieren photographs of the flow over the spiked cones at Mach numbers of 10 and 15 has provided information on the variation of reattachment heat transfer and total heat transfer with body shape and free stream Mach number.

AD-612 761 Div. 9, 30
CFSTI Prices: HC$4.00 MF$0.75

Air Force Weapons Lab., Kirtland AFB, N. Mex.
THE PUFF AND P PUFF COMPUTER PROGRAMS.
Technical rept. for 15 Jan 64-20 Jan 65,
by Richard N. Brodie and James W. Aubrey, Jr.
Mar 65, 106p WL-TR-65-24
Proj. 5710, Task 571015
Unclassified report

Descriptors: (*Hydrodynamics, Programming (Computers)), (*Programming (Computers), Hydrodynamics), One-dimensional flow.

The one-dimensional Lagrangian hydrodynamics computer program PUFF is described. The code is used primarily in the study of X-ray effects and uses finite difference methods to solve the equations of hydrodynamics using slab geometry and assuming 1-dimensional flow through a 1-centimeter-square pipe. The original PUFF was a derivative of a code of the Lawrence Radiation

Laboratory (O. Nance, M. Wilkins, I. Blandord, and H. Smith, 'Sharp,' A one-dimensional hydrodynamics code for the IBM 704,' UCRL-5206-T, 1958). PUFF is now used to refer to an energy deposition code, while P PUFF refers to a plate slap (or flyer plate) code. The two codes are essentially the same except for the generator subroutines. The report explains the major calculations in each subroutine and describes all input-output variables. The subroutines are for the generator, rezoning, editing, equation of state, and input variables. Sample problems with the appropriate data deck are included to allow a user to become familiar with data arrangement and to check the program on his computer. The appendixes include FORTRAN listings of the 2 codes.

AD-612 799 Div. 9
CFSTI Prices: HC$1.00 MF$0.50

Webb Inst. of Naval Architecture, Glen Cove, N. Y.
LECTURE NOTES ON HEAVING OF A BOUY IN REGULAR WAVES.
Final rept.,
by Edward V. Lewis. Dec 64, 22p
Grant Nonr G00063 64

Unclassified report

Presented at the Seminar on Ship Behavior at Sea, Webb Inst. of Naval Architecture, May 64.

Descriptors: (*Buoys, Motion), (*Motion, Buoys), (*Water waves, Buoys), Cylindrical bodies, Mathematical analysis, Pitch (Motion), Ships, Floating bodies, Hydraulic models, Damping, Oscillation, Equations.

The equation of motion is derived for a cylindrical buoy heaving in regular waves. An explicit solution is then obtained in terms of wave amplitude. This simple case is presented as an introduction to the study of the more complex problem of the coupled pitch-heave motion of a ship in waves. (Author)

AD-612 811 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif.
ON THE GENERATION OF SHORT TWO-DIMENSIONAL SURFACE WAVES BY OSCILLATING SURFACE CYLINDERS OF ARBITRARY CROSS-SECTION,
by R. L. Holford. 26 Mar 65, 41p
Technical rept. no. TR-4
Contract Nonr22574, Proj. NR041 313

Unclassified report

Descriptors: (*Water waves, Surface properties), (*Cylindrical bodies, Oscillation), Fluid dynamic properties, Two-dimensional flow, Boundary value problems, Potential theory, Motion.

A simple method is given for determining the amplitude and phase of the surface waves generated by the forced high-frequency oscillations of a cylinder of arbitrary cross-section which is partially immersed, with its axis horizontal, in the free surface of an unbounded fluid. The velocity potential of the forced motion of the fluid is split into two components: the first corresponds to the limit of infinite frequency, for which surface waves are absent, and the second corresponds to the surface-wave motion induced by applying certain pressure forces over the otherwise free surface in the presence of a fixed cylinder. An approximation is then made in which the cylinder is replaced by its tangent plane along a line of intersection of the cylinder and fluid surface. The asymptotic values of the amplitude and phase of the generated waves are calculated for a variety of cross-sections, and the results are found to be in agreement with those which have been obtained rigorously for the cases of a half-immersed circular cylinder and a dock. (Author)

AD-612 877 Div. 9, 31

Mitsubishi Heavy Industries, Ltd., Nagasaki (Japan).
INVESTIGATION INTO THE PROPELLER CAVITATION IN OBLIQUE-FLOW.
Final rept.,
by Kaname Taniguchi and Noritane Chiba. May 64,
42p Rept. no. R-1800
Contract Nonr421400, Proj. NR062 308

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Propellers (Marine), Cavitation), (*Cavitation, Propellers (Marine)), Ship models, Fluid flow, Tests, Japan, Design, Performance (Engineering), Correlation techniques.

Three propeller models of high speed crafts were tested in both axial and oblique-flow conditions in a cavitation tunnel. The test results show that there are decreases in K sub T, K sub Q and e sub p in oblique-flow condition and that the decreases of K sub T and K sub Q are approximately proportional to the angle of inclination squared. The cavitation patterns on a blade varied considerably with its angular position due to the local variation of angle of incidence of the blade section. Using these test results, the sea trial results of the corresponding actual boats were analyzed. Considerable improvement was attained in model-ship correlation using the experimental results in oblique-flow condition, compared to the ordinary method using the axial-flow data. (Author)

AD-612 927 Div. 9, 1, 27
CFSTI Prices: HC$5.00 MF$1.25

LTV Vought Aeronautics Div., Ling-Temco-Vought, Inc., Dallas, Tex.
DATA REPORT FOR LTV LOW SPEED WIND TUNNEL TEST NUMBER 172, TEST OF HIGH MASS RATE VECTORED PROPULSION FLOW MODEL,
by L. J. Mertaugh, Jr. 15 Feb 65, 198p
Rept. no. 2-53310/5R-2172
Contract DA31 124ARO D262, Proj. 5260E
AROD 5260:3

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Vertical take-off planes, Wind tunnel models), (*Wind tunnel models, Vertical take-off planes), Wind tunnels, Tests, Data, Lift, Roll, Pitch motion, Drag, Angle of attack, Aerodynamic characteristics, Aerodynamic configurations, Aerodynamic loading, Thrust vector control systems, Propulsion, Gas flow.

The wind tunnel data resulting from a low speed wind tunnel test of a semi-span model of a close support, VTOL aircraft is presented. The model features an integrated propulsion/lifting surface system as well as vertical and horizontal tails located on an aft, wing tip extension. The propulsion system exhaust flow, which is simulated with cold air, exhausts over the wing trailing edge flap (flap jet) and out of the lower surface of the wing (wing box jet). The exhaust flows can be independently vectored through 90 degrees with respect to the wing chord plane.

The test data are presented in the form of lift and rolling moment coefficients as functions of angle of attack, and drag and pitch moment coefficients as functions of lift coefficient. The coefficient data are given with and without the direct thrust contribution included. The static thrust data are given in the form of lift, drag, pitching moment and rolling moment as functions of angle of attack. No analysis of the data is presented. (Author)

AD-612 976 Div. 9

Institute for the Study of Metals, Univ. of Chicago, Ill.
MODES OF INSTABILITY IN SPIRAL FLOW BETWEEN ROTATING CYLINDERS,
by K. W. Schwarz, B. E. Springett, and R. J. Donnelly. 6 Mar 64, 11p
Contract Nonr212120; Grant NSF G23068
Unclassified report

Pub. in Journal of Fluid Mechanics (Gt. Brit.) v20 pt2 p281-9 1964 (Copies available only to DDC users).

Descriptors: (*Fluid mechanics, Cylindrical bodies), (*Bodies of revolution, Fluid mechanics), Temperature, Stability, Experimental data.

This paper gives the results of an experimental investigation of the stability of spiral flow between rotating cylinders with respect to axisymmetric and nonaxisymmetric disturbances. Various modes of instability were detected by observing visually characteristic ink patterns in the fluid. The effect of small axial flow upon all of the modes was to give an approximately parabolic dependence of the critical Taylor number on the axial flow rate. In the case of an axisymmetric mode, agreement with the theory of Krueger and Di Prima (1964) was found to be excellent.

AD-612 982 Div. 9

Massachusetts Inst. of Tech., Cambridge.
MASS, MOMENTUM AND ENERGY FLUX IN WATER WAVES,
by G. B. Whitham. 20 Mar 61, 14p
Contract AF49 638 708
AFOSR 3599
Unclassified report

Pub. in Journal of Fluid Mechanics (Gt. Brit.) v12 pt1 p135-47 1962 (Copies available only to DDC users).

Descriptors: (*Water waves, Fluid mechanics), (*Fluid mechanics, Water waves), Propagation, Momentum, Energy, Transport properties, Differential geometry.

This paper gives a direct derivation of some results obtained by Longuet-Higgins and Stewart on the amplitude variation of waves propagating on a non-uniform stream. The derivation raises a number of subtle points in the use of the equations of conservation of mass, momentum and energy. These points are of general interest and are discussed in detail with other applications, since they do not seem to have been pointed out previously. (Author)

AD-613 015 Div. 9, 12
CFSTI Prices: HC$3.00 MF$0.75

Advanced Research Projects Agency, Washington, D. C.
OBSERVATIONS OF THE NEAR WAKE REENTRY PHENOMENA BY THE MERCURY ASTRONAUTS.
Technical note,
comp. by A. Goldburg, L. Hromas, C. E. McLain, and J. Menkes. Feb 65, 85p ARPA-TN-64-2
Unclassified report

Rept. comp. with cooperation of Astronauts: M. Scott Carpenter, John H. Glenn, L. Gordon Cooper, and Walter M. Schirra, Jr.
Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Atmosphere entry, Wake), (*Wake, Atmosphere entry), (*Astronautics, Atmosphere entry), Space flight, Astronauts, Reentry vehicles, Ablation, Fluid dynamic properties, Visual inspection, Base flow, Hypersonic flow, Aerodynamic characteristics, Reviews, Antimissile defense systems.

Contents:
Review of Base Flow and Near Wake Problem
Description of the Mercury Spacecraft and General Test Conditions
Detailed Reentry Observations and Data
Conclusions and Discussion.

AD-613 026 Div. 9
CFSTI Prices: HC$4.00 MF$0.75

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
VISCOUS NONEQUILIBRIUM BLUNT BODY FLOWS,
by William C. L. Shih and Roy S. Krupp.
Nov 64, 112p Technical rept. no. TR-100, MIT-DSR-9859
Contract NOw63 0575d
Unclassified report

Descriptors: (*Blunt bodies, Nonequilibrium flow), (*Nonequilibrium flow, Blunt bodies), (*Hypersonic flow, Blunt bodies), (*Superaerodynamics, Blunt bodies), Viscosity, Stagnation point, Frozen equilibrium flow, Shock waves, Heat transfer, Differential equations, Numerical analysis.

A method is developed which effectively reduces the partial differential equations governing the continuum viscous thin shock layer region (including chemical nonequilibrium effects) about a sphere to a set of total differential equations along radial lines across the shock layer. It is applied to regions downstream of the stagnation point. A systematic procedure is presented to obtain higher approximations in order that accuracy and consistency of the approximations made may be ascertained. Depending upon the degree of the approximation the flow field may be determined along either one or more lines with coupling between the lines. Sample calculations for frozen, equilibrium and nonequilibrium cases are included and comparison made with the stagnation point work of Cheng, Chung, Ho and Probstein and experiments of Ferri et al. Heat transfer and shear parameters are in reasonable agreement. Comparison of shock shapes and downstream variation of other flow quantities were not possible since most of the existing works are valid only near the stagnation point. (Author)

AD-613 054 Div. 9

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
HANDBOOK OF SUPERSONIC AERODYNAMICS. SECTION 16. MECHANICS OF RAREFIED GASES,
by Samuel A. Schaaf and Lawrence Talbot. Feb 59, 85p
Contract NOrd7386
NAVWEPS 1488 V5
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $1.25 as D-215.7:1488/V5/SEC16.

Descriptors: (*Handbooks, Superaerodynamics), (*Superaerodynamics, Handbooks), Supersonic flow, Heat transfer, Aerodynamic characteristics.

This section of the Handbook contains information on the flow regimes, free molecular flow and slip flow. The quantitative information presented may be of interest to designers working with the problems of flight at very high altitudes.

AD-613 055 Div. 9

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
HANDBOOK OF SUPERSONIC AERODYNAMICS. SECTION 17. DUCTS, NOZZLES AND DIFFUSERS.
Jan 64, 450p
Contract NOw62 0604c
NAVWEPS 1488 V6

Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C. 20402, $3.25, as D-215.7:1488/V6/SEC17.

Descriptors: (*Handbooks, Superaerodynamics), (*Superaerodynamics, Handbooks), Ducts, Supersonic diffusers, Wind tunnel nozzles, Propulsion, Nozzles, Supersonic flow.

This Handbook section presents the basic techniques and related information needed for the control of duct flow in high-speed propulsion devices and in supersonic and hypersonic wind tunnels. The general mechanical and thermodynamic theory of steady flow in a duct is simplified as much as possible and is concisely reviewed. The effects of many flow parameters are analyzed by considering simple one-dimensional flows in which all but one of the independent variables are held constant. Although such assumptions are somewhat restrictive, it has been shown that their use in many practical problems provides reasonably accurate results. Non-steady, one-dimensional flows are discussed, and methods of solution for a great number of practical problems are outlined. Two- and three-dimensional flows are touched upon briefly. Generalized techniques are presented for the inclusion of viscous and heat-transfer effects by means of which boundary-layer correction may be made to profiles designed for potential flow. The general solutions of duct flow are subsequently applied to specific problems concerning the air intakes of jet engines, various propulsion nozzles, as well as nozzles and diffusers for typical supersonic and hypersonic wind tunnels.

AD-613 056 Div. 9

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
HANDBOOK OF SUPERSONIC AERODYNAMICS. SECTION 8. BODIES OF REVOLUTION.
Oct 61, 365p
Contract NOrd 7386
NAVWEPS 1488 V3

Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $2.50 as D-215.7:1488/V3/SEC8.

Descriptors: (*Handbooks, Superaerodynamics), (*Superaerodynamics, Handbooks), (*Bodies of revolution, Aerodynamic characteristics), Angle of attack, Supersonic flight, Hypersonic flight, Supersonic flow.

This section of the Handbook presents data on the aerodynamic characteristics of bodies of revolution for an angle-of-attack range of zero to almost ninety degrees throughout the supersonic and hypersonic flight regimes. Basic theories governing the pressure distributions on bodies of revolution and in their surrounding flow fields are discussed and evaluated. To provide a basis for the selection of theoretical methods to be used in specific calculation the reliability and accuracy of these theories are compared at different Mach and Reynolds numbers. Actual step-by-step development is omitted except where it is essential to an understanding of resultant expressions. In all cases, however, sources containing full derivations are referenced. To permit comparison or extension of the theoretical methods, experimentally-derived data in many instances are also presented. For those cases in which there is discrepancy between theory and experiment, empirical formulae are given together with the limiting values of the parameters within which the particular formula is valid. Techniques for incorporating the effects of skin friction and heat transfer (treated fully in Sections 13 and 14 of the Handbook) are also given.

AD-613 123 Div. 9

Australian National Univ., Canberra.
NOTE ON A HETEROGENEOUS SHEAR FLOW,
by John W. Miles and Louis N. Howard. 26 Mar 64, 6p

Unclassified report

Pub. in Journal of Fluid Mechanics (Gt. Brit.) v20 pt2 p331-6 1964 (Copies available only to DDC users).
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Fluid mechanics, Two-dimensional flow), (*Two-dimensional flow, Fluid mechanics), Stability, Differential equations.

Goldstein has considered the stability of a shear layer within which the velocity and the density vary linearly and outside which they are constant. Rayleigh had found that the corresponding, homogeneous shear flow is unstable in and only in a finite band of wave-numbers. Goldstein concluded that a small density gradient renders the flow unstable for all wave-numbers. This conclusion appears to depend on the acceptance of all possible branches of a multi-valued eigenvalue equation, and it is shown that the principal branch of this eigenvalue equation yields one and only one unstable mode if and only if the wave-number lies in a band that decreases from Rayleigh's band to zero as the Richardson number increases from 0 to 1/4. (Author)

AD-613 129 Div. 9

Aerojet-General Corp., Sacramento, Calif.
A PARAMETRIC STUDY OF GAS-PARTICLE FLOWS IN CONICAL NOZZLES.
Revised ed.,
by J. D. Hoffman and S. A. Lorenc. 11 Sep 64, 4p
Contract AF04 694 258

Unclassified report

Pub. in AIAA Journal (U. S.) v3 n1 p103-6 Jan 1965 (Copies not available to DDC or Clearinghouse customers)
Revision of rept. dated 15 May 64
Prepared in cooperation with Purdue Univ., Lafayette, Ind.

Descriptors: (*Conical nozzles, Gas flow), (*Gas flow, Conical nozzles), Particles, Mixtures, Two-dimensional flow, Specific impulse, Transport properties, Velocity.

A parametric study of two-dimensional gas-particle flow effects in conical nozzles is presented. Values of

particle throat velocity lag, total mass flow rate, and specific impulses are presented for various cone angles, expansion ratios, throat radii, particle sizes, and particle flow rate ratios for fixed values of chamber pressure and temperature, vacuum ambient pressure, and a gas composition that varies with temperature but is independent of the particle flow rate ratio. (Author)

AD-613 131 Div. 9

Cambridge Univ. (England).
ON THE BEHAVIOR OF SMALL DISTURBANCES TO POISEUILLE FLOW IN A CIRCULAR PIPE,
by A. E. Gill. 12 May 64, 28p

Unclassified report

Pub. in Journal of Fluid Mechanics (Gt. Brit.) v21 pt1 p145-72 1965 (Copies available only to DDC users).

Descriptors: (*Fluid mechanics, Pipes), (*Pipes, Fluid mechanics), (*Perturbation theory, Fluid mechanics), Fluid flow, Reynolds number, Turbulence, Stability, Mathematical analysis.

A simple, but crude, analysis shows among other things that the radius at which the disturbance velocity is a maximum is roughly that at which the velocity of the Poiseuille flow is equal to the frequency, f, times the disturbance wavelength. Eigenfunctions are found precisely for the two limiting cases in which, as f a to the 2nd power/v tends to infinity, the disturbance becomes confined to a thin layer situated (a) near the centre of the pipe, and (b) near the wall. The eigenfunctions are presented graphically in such a way that immediate comparison can be made with some of Leite's experimental results. Good agreement is found. Possible changes in the form and apparent damping rate of a disturbance are discussed in terms of a particular case. Next, an asymptotic procedure is carried out, which proves to give a good approximation to the eigenvalues and eigenfunctions over a wide range of conditions. For simplicity, the calculations are carried out for the case in which the Reynolds number is infinite, so that the eigenvalues depend only on f a to the 2nd power/v. For each mode it is found that the damping rate is an increasing function of the frequency for high frequencies, but as the frequency is decreased the damping rate approaches a limiting value.

AD-613 138 Div. 9, 2

Massachusetts Inst. of Tech., Cambridge.
ON INSTABILITY OF PARALLEL FLOW OF INVISCID FLUID IN A ROTATING SYSTEM WITH VARIABLE CORIOLIS PARAMETER,
by Louis N. Howard and Philip G. Drazin. 19 Dec 63, 18p

Unclassified report

Pub. in Journal of Mathematics and Physics (U. S.) v43 n2 p83-99 Jun 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fluid mechanics, Stability), Perturbation theory, Incompressible flow, Coriolis effect, Vortices, Boundary value problems, Rotation, Geophysics.

AD-613 142 Div. 9

Massachusetts Inst. of Tech., Cambridge.
ON THE INTERACTIONS OF PERMANENT WAVES OF FINITE AMPLITUDE,
by D. J. Benney and J. C. Luke. 30 Jun 64, 5p
Contract Nonr1841 12

Unclassified report

Pub. in Journal of Mathematics and Physics (U. S.) v43 n4 p309-13 Dec 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Water waves, Hydrodynamics), (*Hydrodynamics, Water waves), (*Gravity, Water waves), Incompressible flow, Mathematical analysis.

This paper is concerned with wave motions in an incompressible inviscid fluid under the action of gravity and having a free surface. This is the classical water wave problem. The theory of water waves is concerned with a comparatively simple physical situation which gives rise to a variety of interesting phenomena through nonlinearity. A systematic expansion procedure is presented which will enable the properties of these waves and their interactions to be examined.

AD-613 145 Div. 9, 25

Massachusetts Inst. of Tech., Cambridge.
GROUP VELOCITY AND ENERGY PROPAGATION FOR THREE-DIMENSIONAL WAVES,
by G. B. Whitham. Jan 61, 18p
Contract AF49 638 708
AFOSR 2461

Unclassified report

Pub. in Communications on Pure and Applied Mathematics (U. S.) v14 n3 p675-91 Aug 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Water waves, Three-dimensional flow), Propagation, Fluid mechanics, Velocity, Magnetohydrodynamics, Ships, Hydrodynamics, Boundary value problems, Functional analysis.

In this paper, the generalization to two and three-dimensional wave motions is considered. The results can be described as an analogue of simple geometrical optics. For a non-dispersive medium high frequency waves and discontinuities propagate in a certain sense along the 'rays' which are the curves orthogonal to the surfaces of constant phase. The waves propagate along these rays with the phase velocity, and the amplitude variation agrees with the law that the flux of energy down a ray tube remains constant. For a dispersive medium the analogous rays are based on the group velocity and would not in general be orthogonal to the wave surfaces of constant phase. The amplitude variation is determined by the flux of energy down these 'group lines.'

10. Fuels and Combustion

AD-612 468 Div. 10
CFSTI Prices: HC$3.00 MF$0.75

Bartlesville Petroleum Research Center, Bureau of Mines, Okla.
STORAGE STABILITY OF HIGH TEMPERATURE FUELS.
Rept. for Feb 64-Feb 65,
by Marvin L. Whisman and C. C. Ward. Feb 65, 91p
Contract AF33 615 64 1009, Proj. 3048, Task 304801
APL TR-65-13 P1

Unclassified report

Descriptors: (*Jet engine fuels, Storage), (*Storage, Aviation fuels), Stability, Tracer studies, Heat-resistant materials, Fuel additives, Calorimeters, Chromatographic analysis, Test methods, Radioactive isotopes, Scintillation counters, Tritium, Separation, Thiols, Polycyclic compounds, Labeled substances.

An investigation was made of the influence of fuel constituents on thermal stability during storage of Spec MIL-J-25656B type (JP-6) and other high temperature fuels. Modification of a 5-ml bomb test equipment and method showed promise of permitting precise measurement of labeled fuel components that contribute to deposits during thermal stressing. Three test methods were developed and evaluated for the separation and measurement of radioactivity contributed to deposits and gums by selected fuel constituents. One of these techniques used the principle of liquid-solid chromatography as the separation process followed by liquid scintillation counting of the radioactive reaction products. This method lacked sensitivity and resolution necessary for an acceptable test method. The other two test methods employed gas-liquid chromatography for separation and both ionization chamber counters and liquid scintillation radioassay techniques. An evaluation of these latter procedures showed the chromatographic separation procedures were adequate but quantitative recoveries of gum from the apparatus were dependent upon the radioisotope and fuel system. The migratory nature of tritium under conditions of severe thermal stress was investigated.

AD-612 536 Div. 10, 4, 20
CFSTI Prices: HC$2.00 MF$0.50

Radiation Applications, Inc., Long Island, N. Y.
RADIATION-INDUCED SOLID PROPELLANT DECOMPOSITION.
Final technical rept. 15 Jan 65, 27p
Rept. no. RAI-347
Contract AF49 638 1125
AFOSR 65-0429

Unclassified report

Descriptors: (*Solid rocket propellants, Radiation damage), (*Solid rocket propellant binders, Radiation damage), (*Solid rocket oxidizers, Radiation damage), (*Ammonium compounds, Perchlorates), Photochemistry, Decomposition, Deflagration, Combustion, Reaction kinetics, Burners, Styrene plastics.

A study was initiated on the effect of radiation on ammonium perchlorate composite propellants. This involved the determination of the effect of radiation on the deflagration rates of binder and oxidizer separately from each other and independent of additives or other substances. In addition, the chemical products of ammonium perchlorate radiolysis were studied in detail.

AD-612 661 Div. 10, 4
CFSTI Prices: HC$3.00 MF$0.75

Stauffer Chemical Co., Richmond, Calif.
HIGH ENERGY OXIDIZERS.
Annual technical summary rept. no. 2, 1 Feb 64-31 Jan 65,
by K. O. Christe, J. P. Guertin, and A. E. Pavlath.
31 Jan 65, 53p
Contract Nonr401900, Proj. NR093 035; ARPA Order 399 62

Unclassified report

See also AD-404 779.

Descriptors: (*Solid rocket oxidizers, Fluorochlorides), (*Fluorochlorides, Synthesis (Chemistry)), (*Nitrogen compounds, Fluorochlorides), Ions, Molecular structure, Complex compounds, Spectra (Infrared), Dissociation, Heat of reaction, Arsenic compounds, Electrical conductance, Oxychlorides, Oxyfluorides.

Infrared spectra of C1F2+AsF6(-) and C1F2(+)BF4(-) proved that the C1F2(+) cation is bent and not linear. The synthesis of difluorochlorinium complexes containing high-energy anions, such as NO3(-), N2OF(-), C1O4(-) or C1O3(-), was approached from different directions. A new oxidizer species based on chlorine fluorides, the difluorochlorate (I) anion, C1F2(-), was successfully prepared in the form of its nitrosyl salt. Nitrosyl fluoride reacts with chlorine monofluoride in a 1:1 mole ratio, forming a white solid at -78C, which is completely dissociated in the gas phase at 25C. A pressure-temperature curve gives a heat of reaction, 15.5 kcal/mole, for the dissociation process: complex (s) = NOF (g) + C1F (g). Conductivity and infrared measurements indicate that the complex is ionic in solution and in the solid state, respectively. From these results, the structure, NO(+)C1F2(-), is assigned to the solid complex. Nitrogen trifluoride, AsF5, and elementary fluorine under different reaction conditions failed to produce the desired NF4(+)AsF6(-). (Author)

AD-612 671 Div. 10, 4, 9
CFSTI Prices: HC$1.00 MF$0.50

IIT Research Inst., Chicago, Ill.
ANALYTICAL INVESTIGATION OF THE BURNING MECHANISM OF SOLID ROCKET PROPELLANTS.
Quarterly progress rept. no. 3,
by T. P. Torda and W. J. Christian. 29 Mar 62, 12p
Contract AF49 638 1094, Proj. D244, ARPA Order 24 61

Unclassified report

Presented at the Meeting of Technical Panel on Solid Propellant Combustion Instability (2nd) 9 Mar 62.

Descriptors: (*Solid rocket propellants, Combustion), (*Combustion, Mathematical models), Fluid dynamics, Combustion products, Gases, Laminar flow, Reaction kinetics, Heat transfer, Stability.

The ultimate goal of the investigation is the evolution of a time-dependent theory for the erosive burning of solid rocket propellants. The approach taken involves the use of a fluid dynamic model for the combustion zone. Attention is confined to a laminar-flow, steady-state model with simplified reaction kinetics. However, the analysis is formulated so that subsequent inclusion of time variable phenomena and more sophisticated chemistry will present no essential difficulty, other than increased complexity.

AD-612 698 Div. 10
CFSTI Prices: HC$2.00 MF$0.50

Bell Aerosystems Co., Buffalo, N. Y.

THERMAL RADIATION OF HIGH-TEMPERATURE COMBUSTION PRODUCTS.
Final technical rept. for 3 Dec 63-31 Dec 64,
by T. G. Rossmann. Feb 65, 46p
Rept. no. 9139-933002
Contract AF49 638 1287, Proj. 9751, Task 975101
AFOSR 65-0431
Unclassified report

Research to be continued under Contract AF49 638 1498.

Descriptors: (*Combustion products, Thermal radiation), (*Combustion chamber gases, Thermal radiation), (*Rocket propellants, Combustion products), Flames, Blackbody radiation, Test equipment, Spectrophotometers, High-temperature research, High-pressure research, Mathematical analysis, Reliability, Heat transfer.

The purpose of this program is to amplify the scarce existing information concerning those physical properties of gases which determine their thermal radiation, especially at high temperatures and pressures. The experimental approach consists in determining directly, by means of emission radiometry and spectroradiometry, the magnitude and spectral distribution of the thermal radiation. These measurements will be conducted on gases which appear as or at least are contained in the combustion products of actual combustors, e.g. rocket combustion chambers, and will extend over ranges of temperature, pressure and radiating path lengths as close as possible to the ranges encountered in practice in such combustors. This information will enable the designer to predict, with greatly improved accuracy, the radiant heat flux from the combustion gases to the walls of the combustor.

AD-612 760 Div. 10
CFSTI Prices: HC$3.00 MF$0.75

Coordinating Research Council, Inc., New York.
AVIATION FUEL SAFETY.
Dec 64, 78p
Proj. CA37 64
Unclassified report

Revision of rept. dated Jun 64.

Descriptors: (*Aviation fuels, Fire safety), (*Fire safety, Aviation fuels), Gasoline, Jet engine fuels, Flammability, Kerosene, Ignition, Combustion, Physical properties, Civil aviation, Handling.

The report concerns the safe handling and usage of Aviation Gasolines, Jet A (Kerosine), and Jet B (JP-4), which are currently used as commercial aviation fuels. It was concluded that, while there are differences among the fuels, adoption of a single type of aviation turbine fuel by the entire industry would not significantly improve the over-all excellent safety record of commercial aviation, and that safety is more a function of equipment design, proper handling techniques, and rigorous precautions than of the particular fuel type employed.

AD-612 781 Div. 10, 4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF FRACTIONAL AND HYDROCARBON COMPOSITION OF FUELS ON THERMAL STABILITY,
by E. M. Bushueva and I. E. Bespolov.
16 Mar 65, 13p FTD-TT-64-938
TT 65-61841
Unclassified report

Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) 1963, v. 8, no. 8, p. 49-54.

Descriptors: (*Petroleum, Pyrolysis), (*Fuels, Pyrolysis), (*Pyrolysis, Fuels), Oxidation, Chemical precipitation, Thermochemistry, Aromatic compounds, Hydrocarbons, USSR.

The total content of products of oxidation in various petroleum fractions was found to increase with the rise of the temperature of boiling of the extracts. In accordance with the tendency to form precipitations the petroleum fractions which boil away within identical temperature, limits can be arranged in the following sequence: from hydraulically purified 'green' oil of pyrolysis, gas oil of catalytic cracking, Romashkin petroleum. The maximum amount of precipitates is formed at the temperature of 200C. With further rise in the temperature of oxidation the amount of precipitation goes down. Fuel deprived of aromatic hydrocarbons is highly stable. With the increase in the content of aromatic hydrocarbons in the fuel, the total content of the products of oxidation increases. The precipitation formation reaches a maximum value at a definite concentration of aromatic hydrocarbons and then, with its increase, it goes down. The decrease in the precipitation formation in the products with the increase in the content of aromatic compounds is explained by the solution of highly oxidized compounds in a highly aromatic product. (Author)

AD-612 792 Div. 10, 16, 17
CFSTI Prices: HC$2.00 MF$0.50

Melpar, Inc., Falls Church, Va.
MECHANISM OF MICROBIOLOGICAL CONTAMINATION OF JET FUEL AND DEVELOPMENT OF TECHNIQUES FOR DETECTION OF MICROBIOLOGICAL CONTAMINATION.
Quarterly progress rept. no. 5, 1 Jun-1 Sep 64,
by Gordon C. Blanchard and Charles R. Goucher.
Mar 65, 48p
Contract AF33 657 9186, Proj. 3048, Task 304801
Unclassified report

See also AD-606 771.

Descriptors: (*Fuel contamination, Microorganisms), (*Jet engine fuels, Biological contamination), (*Aluminum alloys, Corrosion), Fuel systems, Fuel additives, Nitrates, Hydrocarbons, Oxidation, Antioxidants, Toxicity, De-icing materials, Corrosion inhibition, Metal coatings, Degradation, Electrons, Viability, Culture media, Growth, Lipids, Phenols.

This study is concerned with the detection of microorganisms in fuel-water environments and with the mechanisms by which these microorganisms cause problems in fuel systems of aircraft. Fuel isolates removed nitrate from growth medium containing iron and calcium, causing it to become more corrosive to aluminum alloys. Upon prolonged incubation (200 days) fuel isolates produced substances corrosive to aluminum alloys. Microbial sludge, which can cause corrosion, contained N, C, H, and O. Nitrate did not prevent corrosion caused by nitrated phenols; and nitrate does not prevent corrosion caused by media in which fuel isolates have gown for long periods of time. Emulsion-forming organisms contained considerably more lipid material than fuel isolates which were sedimentable in water. Some fuel additives were observed to support the growth of fuel isolates while most anti-icing and metal deactivators were mildly toxic. Respiratory inhibition and ability to kill fuel isolates was demonstrated for pentene, hexene, heptene, octene, and nonene but not for decene or dodecene. The saturated homologs of these compounds were either innocuous or supported growth. (Author)

AD-612 795 Div. 10, 1
CFSTI Prices: HC$3.00 MF$0.75

Dayton Univ., Ohio. Research Inst.
PHYSICAL AND CHEMICAL PROPERTIES OF JP-4 JET FUEL FOR 1963.
Rept. for 1 Feb-1 Jul 64,
by W. E. Brockman and D. S. Duvall. Jan 65, 96p
Contract AF33 657 9175, Proj. 3048, Task 304801
APL TR-64-148

Unclassified report

Descriptors: (*Jet engine fuels, Quality control), Air Force, Statistical data, Physical properties, Chemical properties, Specifications, Data.

This report summarizes suppliers' inspection data on 140 million barrels of JP-4 jet fuel furnished to the AF during 1963. Data summarized were reported to AF Aero Propulsion Laboratory, Wright-Patterson Air Force Base, for 8 geographic districts around the world. Of 20 standard specification tests selected for inclusion in this study and reported by geographic district, nineteen show a skewed distribution and one (Reid vapor pressure) was normally distributed. A possible explanation for the skewed results is the lack of both upper and lower limits in most specification tests. (Author)

AD-612 892 Div. 10, 4, 27
CFSTI Prices: HC$2.00 MF$0.50

Rocket Power, Inc., Pasadena, Calif.
STUDY OF ROCKET ENGINE EXHAUST PRODUCTS.
Quarterly rept. no. 14, 1 Nov 64-31 Jan 65.
31 Jan 65, 30p
Contract AF04 611 7414

Unclassified report

Also see AD-609 303.

Descriptors: (*Rocket propellants, Combustion products), (*Exhaust gases, Thermochemistry), (*Thermodynamics, Rocket propellants), Aluminum compounds, Halides, Dissociation, Recombination reactions, Enthalpy, Entropy, Heat of formation, Heat of fusion, Heat of sublimination, High temperature research, Rocket propellants, Vapor pressure.

From a study of the reversible reaction 2Al (1) + AlF3 (g) yields 3A1F(g) between 1199 and 1348K by means of the transpiration technique an increment Hr 1273K of 93.35 ± 1.78 kcal and an increment Sr 1273K of 62.15 ± 1.37 cal/deg/mole were obtained. Extrapolation to 298K by means of published thermal functions coupled with the use of published thermodynamic data for Al and AlF3 yields values of -60.65 ± 0.59 kcal/mole and 51.93 ± 0.46 cal/deg/mole for the increment Hf 298 and S 298 AlF(g) respectively. The increment H(o) sub f 298 for AlCl(g) of -13.5 ± 0.4 kcal/mole is reported based on the first experimental second law measurements for the reaction 2 Al(1) + AlCl3(g) = 3 AlCl(g) by a Molecular Flow Effusion study over the temperature range 930K to 1034K. The first experimental value for S(o) 298 of AlCl3(g) of 82.5 ± 1.5 cal/deg/mole is also derived from these measurements. (Author)

AD-613 050 Div. 10, 4, 14
CFSTI Prices: HC$3.00 MF$0.75

Bureau of Mines, Pittsburgh, Pa. Explosives Research Center.
IGNITION CHARACTERISTICS OF FUELS AND LUBRICANTS.
Summary rept. for 1 Jan-31 Dec 64,
by Joseph M. Kuchta and Ralph J. Cato. Mar 65,
57p
Contract AF 33 657 63 376, Proj. 3048, Task 304801
APL TR-65-18

See also AD-600 002.

Unclassified report

Descriptors: (*Jet engine fuels, Ignition), (*Airplane engine oils, Ignition), (*Autoignition, Reaction kinetics), Aliphatic compounds, Oxidation, Oxygen, Temperature, Jet flames, Vapors, Fire safety, Lubricants.

Hot surface ignition temperature data are presented for n-hexane, n-octane, n-decane, JP-6 jet fuel and aircraft engine oils MIL-L-7808 (0-60-18) and H-1026 in various oxygen-nitrogen atmospheres (2.5 to 100 volume percent oxygen) under stagnant or near-stagnant flow conditions. Minimum ignition temperatures were found to increase with decreasing oxygen concentration. In vessel ignitions, these temperatures increased with decrease in fuel contact time and with increase in surface area/volume ratio. In wire ignitions, the minimum ignition temperatures increased with decrease in wire diameter, length/diameter ratio, and initial mixture temperature. Expressions were developed to define the ignition temperatures as a function of the above pertinent variables. Hot gas ignition temperatures of the above combustibles were also found to vary with the heat source diameter, for 1/8, 3/8 and 1/2-inch diameter jets. In oxidation studies with n-octane vapor air-mixtures, rates of pressure rise were found to vary as the 0.38 power of the fuel concentration (5 to 30 volume percent) and as the 1.4 power of the initial total pressure (0.6 to 13 psia) at temperatures between 428 and 536F. (Author)

AD-613 077 Div. 10
CFSTI Prices: HC$5.00 MF$1.00

Southwest Research Inst., San Antonio, Tex.
A STUDY OF RAPID SOLIDIFICATION OF HYDROCARBON FUELS.
Final rept.,
by Eugene C. Martin. Feb 65, 172p
Contract DA44 177tc819, Task 1D121401A14216
TRECOM TR-64-66

Unclassified report

Descriptors: (*Solid jet engine fuels, Preparation), (*Gels, Solid jet engine fuels), (*Hydrocarbons, Gels), Amines, Ureides, Burning rate, Impact shock, Vaporization, Amides, Polyamide plastics, Isocyanate plastics, Organic phosphorus compounds, Chlorides, Ignition, Bibliographies.

Progress is reported on rapid methods for gelling aircraft fuels. The most promising systems consists of amines and diisocyanates. The properties of the gel are influenced by the structure of the amine and isocyanate. Various types of gels can be produced. These include particulate, viscoelastic, and dilatant gels. Gelation rates as fast as 0.04 second were obtained. In addition, several systems will rapidly gel fuel from -55C to 60C. The results show that the various gels will retard the burning rate of the fuels and will contain the fuel while burning. The viscoelastic and dilatant gels have excellent impact properties. The gelation of aircraft fuel will signifcantly decrease the fuel vaporization rate. A comparison was made of the various gels prepared. Some of the gels are almost as effective at 2.5 weight percent concentration as at a concentration of 4.0 weight percent. (Author)

11. Ground Transportation Equipment

No Entries

12. Guided Missiles

AD-612 460 Div. 12, 7
CFSTI Prices: HC$3.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
PROGRAM ROE (REFLECTOR ORBITAL EXPERIMENT). PART III. PRELIMINARY DESIGN: INFLATABLE RIGIDIZED SOLAR REFLECTOR CONCEPT. VOLUME I. THE TEN-FOOT-DIAMETER DESIGN,
Dec 64, 68p Rept. no. LMSC-A702683
Contract AF33 657 10668, Proj. 3145, Task 314502
APL TR-64-132 P3 V1

Unclassified report

Subcontracted to Goodyear Aerospace Corp., Akron, Ohio, Rept. no. GER-11639
See also AD-612 014 through AD-612 016.

Descriptors: (*Solar radiation, Reflectors), (*Reflectors, Solar radiation), (*Satellites (Artificial), Solar radiation), (*Inflatable structures, Reflectors), Expanded plastics, Design, Weight, Power, Radiometers, Diodes (Semiconductor), Light pulses, Television display systems.

The conceptual design configuration and a preliminary design analysis are presented for a 10-foot-diameter, 60-degree-rim-angle, inflatable, rigidizable concentrator. The design of instrumentation for focal-zone, heat-flux measurement and reflectance degradation detection is described. An estimated weight summary, mass properties and distribution data, and estimated power requirements are presented. (Author)

AD-612 622 Div. 12, 1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
HYPERSONIC TURNING WITH CONSTANT BANK ANGLE CONTROL,
by F. S. Nyland. Mar 65, 50p Rept. no. RM-4483-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Reentry vehicles, Descent trajectories), (*Descent trajectories, Reentry vehicles), (*Boost-glide vehicles, Trajectories), Atmosphere entry, Hypersonic flight, Flight paths, Angle of attack, Control, Lift, Drag, Equations, Motion, Mathematical models, Digital computers.

The report presents the elements of a model for predicting the turning trajectories of hypersonic reentry gliders by approximate closed form solutions. Vehicle control is assumed to be exercised by varying the angle of attack and bank angle. In this investigation the control variables are assumed to be constant for each particular trajectory, but the lift-to-drag ratio (L/D) was varied from 1.0 to 4.0 and the bank angle was permitted to become as large as 90 deg. Approximate closed form solutions are compared with earlier results of a study of minimum energy hypersonic turns. (Author)

AD-612 694 Div. 12, 2, 30
CFSTI Prices: HC$3.00 MF$0.50

Army Missile Command, Redstone Arsenal, Ala.
LUNAR PROBE FLIGHT: INTRODUCTION TO FLIGHT GEOMETRY AND ACCURACY PROBLEMS,
by R. F. Hoelker. 22 Aug 58, 52p
Rept. no. DA-TN-58-58

Unclassified report

Descriptors: (*Lunar probes, Lunar trajectories), (*Lunar trajectories, Celestial mechanics), Space flight, N-body problem, Earth, Moon, Launching, Numerical analysis, Azimuth, Motion, Gravity, Reliability.

The report presents the flight geometry that describes the orbit of a lunar probe in relation to the movements of the terminal bodies, earth and moon. By choosing a suitable reference system and by simplifying the three body problem to a two body problem in neglecting the force field of the moon, the problem is amenable to an analytical approach that, though approximate, brings forward all characteristic features proper to the exact solution.

AD-612 724 Div. 12, 9
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Moncia, Calif.
ANALYTIC TRAJECTORIES FOR AEROSPACE PLANE,
by F. S. Nyland. Nov 64, 82p RM-4357-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Aerospace planes, Suborbital trajectories), (*Suborbital trajectories, Aerospace planes), Launch vehicles (Aerospace), Aerodynamic characteristics, Maneuverability, Flight paths.

In this analysis, the flight of a lifting vehicle to orbit speed is considered by studying four basic powered aerodynamic maneuvers: pull up, climb at a constant path angle, leveling off, and cruising at constant altitude. Solutions for trajectory parameters are presented for each phase of flight and an example is considered. Although two basic forms of further research are suggested for application to Aerospaceplane planning, such suggestions would have impact on lifting reentry technology as well. (Author)

AD-612 733 Div. 12, 9
CFSTI Prices: HC$1.00 MF$0.50

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
A METHOD FOR CALCULATING THE INTERACTION OF A BOW SHOCK OF A RE-ENTRY VEHICLE AND A BLAST WAVE,
by Thomas D. Taylor. Feb 64, 18p
Technical rept. TR-3152

Unclassified report

Descriptors: (*Reentry vehicles, Shock waves), (*Shock waves, Reentry vehicles), (*Hypersonic flow, Numerical analysis), Blast, Impact shock, Atmosphere entry, Nose cones, Axially symmetric flow, Pressure, Density, Velocity, Programming (Computers).

A general technique for computing the transient flow field in the nose region of a blunt body traveling at hypersonic speeds after being intercepted head-on by a shock wave is presented. The method is not limited to the assumption that the density, pressure and velocities are constant in the interaction region which has been the assumption in previous investigations of this problem. The technique can be applied to compute the flow in the entire interaction region, but is discussed here for computing the low near the axis of symmetry. (Author)

AD-612 905 Div. 12, 30
CFSTI Prices: HC$7.00 MF$1.75

Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.

DEVELOPMENT OF AN ABSTRACT MODEL FOR AEROSPACE MAINTENANCE SYSTEMS.
Final rept. for 10 Feb 64-9 Feb 65,
by Charles M. Riehl, John P. Van Blarcom, Claire B. Schneider, and Ralph J. Ceci, Jr. 9 Mar 65, 348p
SID-64-2172
Contract AF33 615 1330
APL TR-64-150

Unclassified report

Descriptors: (*Manned spacecraft, Space maintenance), (*Space maintenance, Mathematical models), (*Mathematical models, Space maintenance), Digital computers, Programming (Computers), Simulation, Malfunctions, Programming languages.

This report describes the development and operation of a digital computer model capable of simulating aerospace maintenance systems. Model scope is concerned with both prelaunch maintenance activity performed to prepare an aerospace system for launch and post-launch maintenance activity performed during the mission. A distinct sub-model has been developed for each phase. The model routines are written on a general basis, employing the SIMSCRIPT program language, to enable model application to a variety of aerospace programs. Model flow patterns are generally deterministic with allowances for disruptive events caused at random times by hardware malfunctions. The model is assigned to produce predictive output information regarding the operation and efficiency of the maintenance system during the time period of interest and its contribution to the aerospace program in terms of schedule fulfillment. (Author)

AD-613 081 Div. 12, 9
CFSTI Prices: HC$7.00 MF$1.75

Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.
TRANSIENT DYNAMIC RESPONSE OF ORBITING SPACE STATIONS,
by C. L. Tai, L. V. Andrew, M. M. H. Loh, and P. C. Kamrath. May 64, 363p SID-64-43
Contract AF33 657 10219, Proj. 1370, Task 137008
FDL TDR-64-25; IDEP 347. 95.00.00-FL-28

Unclassified report

Descriptors: (*Astronautics, Space stations), (*Space stations, Structural properties), (*Celestial mechanics, Space stations), Space environmental conditions, Orbital trajectories, Manned spacecraft, Aerodynamic characteristics, Aerodynamic configurations, Experimental data, Graphics.

The dynamic responses of thirteen selected configurations, composed of two to three inter-connected compartments and subjected to various applied disturbances, were investigated first by approximate exploratory analyses to determine the significant configurations for space stations and the relative significance of transient inputs to each configuration. Then detailed analyses of ten selected combinations of configurations and forcing functions were carried out in depth. In addition, because of the unique dynamic response problems of the cable-connected configuration, the Y-configuration and the H-configuration of space stations subjected to the influence of the gravitational gradient and elastic effects, separate detailed analyses of these configurations were conducted. (Author)

AD-613 139 Div. 12

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
LONGITUDINAL DYNAMICS OF A LIFTING VEHICLE IN ORBITAL FLIGHT.
Revised ed.,
by Bernard Etkin. 10 Oct 60, 11p
Contract AF49 638 761
AFOSR 3598

Unclassified report

Pub. in Journal of the Aerospace Sciences (U. S.) v28 n10 p779-88 Oct 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Boost-glide vehicles, Dynamics), (*Orbital trajectories, Boost-glide vehicles), Flight paths, Thrust, Oscillation, Aerodynamic characteristics, Pitch (Motion), Stability, Lift, Mathematical analysis, Equations, Perturbation theory, Damping, Canada.

A report is presented of an analytical study of the longitudinal perturbations to the steady orbital flight of a lifting self-propelled vehicle in a circular orbit. The equations are so formulated as to lead to the correct limits at the two extremes--satellites in space and aircraft in the lower atmosphere. Additions to the conventional equations of airplane dynamics are found to be necessary to account for the vertical gradients of gravity and atmospheric density and for the curvature of the undisturbed flight path. Calculations were perfomed with both linear and nonlinear equations for a particular set of aerodynamic and inertial parameters, and altitudes from 100,000 to 700,000 ft. The linear solutions contain two oscillatory components which can be identified with the classical phugoid and short-period modes, and a new spiral mode which may be unstable or stable, depending on the thrust law. With increasing altitude, the period of the phugoid approaches asymptotically to the orbital period, and that of the 'short' -period mode tends to infinity. In the altitude range of nearly equal periods there is beating of the two oscillations, producing dynamic instability in pitch. The solutions of the nonlinear equations show that the linear theory is valid for a practical range of the disturbance amplitudes. (Author)

13. Installations and Construction

AD-612 663 Div. 13, 25
CFSTI Prices: HC$4.00 MF$0.75

Illinois Inst. of Tech., Chicago.
THE SIGNIFICANCE OF CONCENTRATED LOADS IN LIMIT ANALYSIS OF SHELLS,
by John A. DeRuntz, Jr. and Philip G. Hodge, Jr.
Dec 64, 102p Rept. no. DOMIIT-1-27
Contract Nonr140604, Proj. NR064 429
Unclassified report

Descriptors: (*Structural shells, Loading (Mechanics)), (*Loading (Mechanics), Structural shells), Distribution, Stresses, Tensile properties, Mechanics, Thickness, Configuration, Mathematical analysis.

The yield point load of a simply supported conical sandwich shell loaded at its vertex through a rigid central boss is found for a material obeying the Tresca yield condition. Exact solutions are found for a wide range of shell configurations ranging from thick shallow cones to thin steep ones and including large and small boss sizes. The results are compared with those for the limiting case of zero boss radius corresponding to a complete conical shell loaded with a concentrated load at its vertex. It is found that for thick shallow shells the concentrated load solution is a good approximation to the solution for realistically small boss sizes, but that for thin and/or steep shells the agreement is so poor as to make the concentrated load solution meaningless. (Author)

AD-612 687 Div. 13, 14
CFSTI Prices: HC$3.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
STRUCTURAL OPTIMIZATION OF FOAM-CORE AND HONEYCOMB-CORE SANDWICH CYLINDERS UNDER AXIAL COMPRESSION.
Technical rept.,
by A. Bruce Burns. Dec 64, 67p Rept. no. 6-62-64-17
Unclassified report

Descriptors: (*Cylindrical bodies, Sandwich construction), (*Honeycomb cores, Cylindrical bodies), (*Expanded plastics, Cylindrical bodies), (*Sandwich construction, Cylindrical bodies), Honeycomb cores, Foams, Expanded plastics, Loading (Mechanics), Compressive properties, Mathematical analysis, Deformation, Stresses, Stability, Programming (Computers), Aluminum, Weight, Structures.

Data for the optimum structural design of foam-core and squarecell-honeycomb-core sandwich cylinders under axial compression are presented in this report. For predicting the general mode of instability, the method recently proposed by Almroth is employed, which includes the effects of transverse shear deformations. This method also utilizes the upper and lower bounds to the critical buckling load, and an empirical factor applied to the difference between the two bounds. Although the data presented relate to sandwiches having facings of equal thickness and identical material the computer programs developed to generate these data are capable of analyzing sandwiches wherein the facings are dissimilar with respect to thickness and/or material. The computer programs are presented in appendixes, along with a summary of information on the shear moduli for various sandwich configuration. It is shown that practical foam-core and squarecell-honeycomb-core constructions are possible at low loading indexes which are more efficient than conventional construction involving rings and stringers of rectangular cross section. At high loading indexes, where the stresses in the sandwich facings approach the maximum permissible stress, these sandwich constructions show little superiority over conventional construction, and may even be less efficient. (Author)

AD-612 764 Div. 13, 2
CFSTI Prices: HC$4.00 MF$0.75

Army Coastal Engineering Research Center, Washington, D. C.
A PICTORIAL HISTORY OF SELECTED SUBJECTS ALONG THE NEW JERSEY COASTLINE,
comp. by W. H. Vesper and M. G. Essick.
Oct 64, 101p
Miscellaneous paper no. 5-64
Unclassified report

Descriptors: (*Beaches, New Jersey), (*Seacoast, New Jersey), (*Breakwaters, New Jersey), Photographs, Structures, Hydrology, Civil engineering.

Comparative photographs (ground shots) of shore structures in New Jersey are shown covering a period 1930 to 1961. (Author)

AD-612 776 Div. 13, 25
CFSTI Prices: HC$1.25 MF$1.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
STATIC AND DYNAMIC BEHAVIOR OF PINNED-BASE PORTAL FRAMES.
Final rept. for Mar-Oct 61,
by Stanley K. Takahashi and Richard H. Chiu.
18 Feb 65, 148p Technical rept. no. R-336
Proj. Y F008 08 02 102, DASA13 018
Unclassified report

Descriptors: (*Structural parts, Loading (Mechanics)), (*Loading (Mechanics), Structural parts), Blast, Tolerances (Mechanics), Beams (Structural), Shear stresses, Fastenings, Steel, Tensile properties, Numerical analysis, Tests, Vibration, Design, Elasticity, Dynamics, Statics.

Tests were performed on four steel portal frames, 8 feet high and 12 feet long, fabricated from 12WF27 rolled sections. The frames were constant in cross section and hinged at their bases. Maximum static and dynamic loads of 75,000 and 80,000 pounds, respectively, were applied over one column of each frame to simulate a horizontal, travelling, blast wave. The rise times of the dynamic loads were approximately 2 to 3 milliseconds. The loads then decayed exponentially to zero in about 1 second. An equivalent triangular load-time function was used for analysis. After several dynamic loads were placed on one column of one frame, the opposite column was loaded to determine the effect of repeated and reversed loading. The applied loads and the resulting deflections, strains, and accelerations were measured. The reduced data are presented in graphical and tabular forms. The multiple-mode, the simplified, and the response-chart methods of dynamic analysis were performed, and the results were compared with the experimental values. The multiple-mode analysis proved to be the only method that can be used to predetermine the locations of plastic hinges, however, the single-degree of-freedom system adequately described the maximum displacement of the frame in both the elastic and inelastic ranges. Good correlation was obtained between theoretical and experimental values for both the static and dynamic tests. The dynamic response factor and the dynamic shear factors were 1.9 and 1.4 respectively. (Author)

AD-613 002 Div. 13, 26, 30
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.

USE OF HYBRID COMPUTING IN DESIGN AUTOMATION,
by A. J. Rowe and P. Brock. Mar 65, 23p
Rept. no. F-3086

Unclassified report

Descriptors: (*Drafting, Automation), (*Design, Automation), (*Analog-digital computers, Drafting), Data processing systems, Display systems, Production, Mechanical drawings, Engineering, Programming (Computers), Programming languages, Information retrieval.

A number of computer devices, now available for assistance in engineering and drafting are discussed. Consideration is given to programming language requirements. Other aspects of the problem include questions of information storage and retrieval, numerical machine controls, and more efficient computational methods for design, including simulation and heuristic techniques.

AD-613 043 Div. 13, 2, 30
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CONFINED CREEP TESTS ON POLAR SNOW,
by Malcolm Mellor and George Hendrickson.
Feb 65, 13p Research rept. no. RR-138

Unclassified report

Descriptors: (*Snow, Creep), (*Creep, Snow), Density, Temperature, Plasticity, Viscosity, Compressive properties, Test methods, Test equipment, Pipes, Polar regions.

Snow was sampled from various depths below the surface of the ice sheet at Byrd and Amundsen-Scott Stations, Antarctica. The samples were obtained either by sawing blocks from trench and tunnel walls or by coring with the CRREL hand auger. The creep specimens were introduced into their stainless-steel cylinders by 'screwing' the saw-edged cylinders into larger sample blocks. The cylinders were standard CRREL snow-sampling tubes, lined with silicone grease to reduce friction and adhesion. The tubes were set vertically on a bench, and pressure was applied axially with a loose piston loaded by a guided yoke, deformations being read periodically from dial micrometers. The mechanics of creep is discussed and the data are tabulated and graphed with respect to temperature and density effects. At the lower densities, the compressive viscosities are in reasonable agreement with those deduced from depth-density profiles. At the higher densities, the viscosities are significantly lower than those calculated from depth-density profiles. It is suggested that at least part of the discrepancy may be attributed to the strain history of the snow. The creep tests suggest a functional relationship between viscosity and density different from that suggested by analyses of natural snow densification. (Author)

AD-613 051 Div. 13
CFSTI Prices: HC$3.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
UNDERSNOW STRUCTURES: BYRD STATION, ANTARCTICA,
by Malcolm Mellor and George Hendrickson.
Feb 65, 52p Technical rept. no. TR-138

Unclassified report

Descriptors: (*Snow, Structural properties), (*Polar regions, Construction), (*Prefabricated buildings, Polar regions), Underground structures, Ice, Floors, Foundations (Structures), Ventilation, Sewage, Deformation, Temperature, Design, Graphics.

Byrd Station consists of a network of shallow tunnels containing light, T-5-type, prefabricated buildings and other items of equipment. Some small buildings (e.g., aurora tower, balloon pavilion, rawin dome) are elevated above the snow surface on extensible columns. The tunnels were constructed by the "cut-and-cover" method. Data are given concerning tunnel deformation, floor levels and foundation settlement, temperature measurements, ventilation, and other tests. Deformation data are analysed to provide design information for future construction, and it is shown that heat loss from buildings increase the rate of tunnel deformation substantially. The appendixes discuss snow reinforcement tests, air permeability of snow and the ventilation of undersnow camps, and the thermal effects of water wells and sewage sinks. (Author)

AD-613 074 Div. 13, 17
CFSTI Prices: HC$3.00 MF$0.50

Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
WELDED CONTINUOUS FRAMES AND THEIR COMPONENTS. FURTHER STUDIES ON THE LATERAL-TORSIONAL BUCKLING OF STEEL BEAM-COLUMNS,
by Theodore V. Galambos, Peter F. Adams, and Yuhshi Fukumoto. Feb 65, 52p Rept. no. 205A.36
Contracts Nobs90041, NBY53160

Unclassified report

Descriptors: (*Beams (Structural), Steel), (*Buckling (Mechanics), Beams (Structural)), Stresses, Loading (Mechanics), Failure (Mechanics), Strength, Performance (Engineering), Tests, Tables, Design.

In this report solutions are presented for the inelastic lateral-torsional buckling strength of as-rolled steel wide-flange beam-columns. The beam-columns are subjected to an axial force and the bending moments applied either at one end of the member only or equally to both ends. The reduction in strength as compared with the optimum performance of the member is examined and the influence of the cross-section size, yield stress level, and residual stress level on the lateral-torsional buckling strength is determined. The theoretical solutions are then compared with an empirical reduction formula which is proposed for design purposes. Available test results are compared with the theory as represented by this reduction formula. (Author)

14. Materials (Non-Metallic)

AD-612 466 Div. 14, 20
CFSTI Prices: HC$4.00 MF$0.75

General Dynamics/Fort Worth, Tex.
EFFECTS OF REACTOR RADIATION AND TEMPERATURE EXPOSURE ON A SOLID POLYURETHANE ELASTOMER AND A POLYURETHANE FOAM.
Final rept. for 1 Oct 63-30 Sep 64,
by P. M. Johnson, J. H. Lewis, and M. R. Self.
Dec 64, 102p Rept. no. FZK-195
Contract AF29 601 6213, Proj. 6773, Task 677302
WL TR-64-131
Unclassified report

Descriptors: (*Isocyanate plastics, Radiation damage), (*Elastomers, Radiation damage), (*Radiation damage, Isocyanate plastics), Expanded plastics, Tensile properties, Compressive properties, Hardness, Molecular properties, Loading (Mechanics), Density, Degradation, Temperature, Synthetic rubber, Foam rubber, Gamma rays.

A polyurethane elastomer and a polyurethane foam have been irradiated to six gamma dose levels in the range of from 3 x 10 to the 8th power to 9 x 10 to the 10th power ergs/gm(C) at 75F and 240F. The elastomer was irradiated as tensile specimens and compressed buttons and the foam was irradiated as compressed and uncompressed buttons. Tensile properties, hardness, compression set, weight change, and specific gravity were measured for the elastomer. Compression set, compression load deflection, and density were measured for the foam. The data were analyzed by use of several theoretical and empirical equations to obtain molecular interpretation of the radiation effects. Molecular weight between crosslinks, based on stress-strain data for the elastomer, and the rate constant for chain cleavage from stress relaxation in the foam were obtained as a function of radiation dose. Also, the network chains effective in creating compression set were calculated for both materials. The elastomer is considered to be a radiation-resistant material up to a dose to 10 to the 10th power ergs/gm(C). The foam appears to be a favorable material for use in the radiation fields at moderate temperature and dose. (Author)

AD-612 488 Div. 14, 25
CFSTI Prices: HC$2.00 MF$0.50

Polymer Research Inst., Univ. of Massachusetts, Amherst.
STRUCTURAL INTERPRETATIONS OF MECHANICAL PROPERTIES OF POLYCRYSTALLINE POLYMERS,
by Richard S. Stein. 7 Aug 64, 35p
Technical rept. no. TR-66
Contract Nonr335701, Proj. NR356 378
Unclassified report

See also AD-429 923.

Descriptors: (*Polymers, Crystal structure), (*Polyethylene plastics, Mechanical properties), (*Crystal structure, Polyethylene plastics), X-ray diffraction analysis, Optical properties, Deformation, Crystallization, Viscoelasticity, Mechanical properties.

The morphology of crystalline polymers may be affected by conditions of preparations and greatly affects the mechanical response of the polymer. The arrangement of the crystals in spherulite-like aggregates and the interaction among these crystals influences their viscoelastic behavior. Evidence for the nature of the response of these crystalline aggregates may be obtained by optical techniques such as dynamic light scattering and x-ray diffraction. (Author)

AD-612 504 Div. 14, 12, 27
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., White Oak, Md.
HIGH TEMPERATURE RESISTANT MATERIALS FOR MISSILE PROPULSION SYSTEMS.
Summary rept. for 30 Jun 63-30 Jun 64,
by F. J. Koubek, B. T. Hartmann, and D. M. Caum.
25 Nov 64, 69p Rept. no. NOLTR-64-207
Task RMMP23 054 212 1F009 06 003
Unclassified report

See also AD-408 362.

Descriptors: (*High-temperature research, Materials), (*Rocket motors (Solid propellant), Heat-resistant materials), (*Heat-resistant materials, Rocket motors (Solid propellant)), Heat shields, Thickness, Thermal diffusion, Partial differential equations, Laminates, Phenolic plastics, Nylon, Ablation, Polyamide plastics, Synthetic rubber, Asbestos, Wood, Silicone plastics, Epoxy plastics, Glass textiles, Powders, Potassium compounds, Oxalates, Silicon compounds, Dioxides, Environmental tests, Thermal insulation, Rocket motor nozzles.

A method was devised to compute the thickness of heat shield needed for given conitions and variations in critical parameters were studied. When a constant (average) value for effective thermal diffusivity (alpha) of a phenolic-nylon material was used in place of a variable experimental alpha, the required thickness of ablator changed by 5% or less. However, when a constant (average) value for heat flux was substituted for variable heat flux, the required thickness changed by as much as 40%. Environmental studies were made on typical organic ablators in the arc image furnace. Most ablators were more efficient at high heat fluxes than at low ones, more efficient in argon than in air, and more efficient without shear forces than with shear forces acting on them. An alpha-rod automatic feed device was developed to the point where it was operated satisfactorily in experiments on a number of ablators in the oxy-acetylene burner. The analog system for reducing alpha-rod data was found to have an average error of ±5% and was put into routine operation. The proposed A.S.T.M. oxy-acetylene panel test was balloted in Sub-Committee III and approved for Committee D-20 letter ballot. (Author)

AD-612 561 Div. 14

Explosives Research and Development Establishment, Waltham Abbey (England).
REINFORCING EFFECTS OF SILICON-NITRIDE WHISKERS IN SILVER AND RESIN MATRICES,
by N. J. Parratt. 16 Jun 64, 18p Offprint-64/13
Unclassified report

Pub. in Powder Metallurgy (Gt. Brit.) v7 n14 p152-67 1964 (Copies available only to DDC users).

Descriptors: (*Composite materials, Fibers), (*Silicon compound, Nitrides), (*Fibers, Reinforcing materials), Silver, Epoxy plastics, Elasticity, Tensile properties, Thermal properties, Great Britain.

Whiskers of silicon nitride have been incorporated in two representative matrices--silver and an epoxide resin. The techniques are described and the measured properties of the composite materials discussed in the light of existing theories of reinforcement. Reinforcement has been

established both in silver and resin, using the whiskers in random orientation. Increases in Young's modulus, tensile strength, and hot strength are obtained with relatively small volume fractions of whiskers. The nature of the discrepancies between practical and ideal values of these properties indicates the course of future work. (Author)

AD-612 562 Div. 14, 17

Explosives Research and Development Establishment, Waltham Abbey (England).
SOME CONSIDERATIONS IN THE DESIGN OF ENGINEERING MATERIALS BASED ON BRITTLE SOLIDS,
by J. E. Gordon. Dec 64, 8p
Offprint 64/14

Unclassified report

Pub. in Royal Society of London. Proceedings. Series A. Mathematical and Physical Sciences (Gt. Brit.) v282 p16-23 1964 (Copies available only to DDC users).

Descriptors: (*Materials, Design), (*Solids, Brittleness), Composite materials, Engineering, Structures, Metals, Strength, Strain (Mechanics), Fibers, Bonding, Glass, Films, Sheets, Fiber metallurgy, Reinforcing materials, Plywood, Silicon compounds, Carbides, Nitrides, Great Britain.

The object is to point out that the new knowledge about strength and fracture is valuable more because it enables exploitation of covalent solids of the highest stiffness and melting point than merely the strengthening of existing metals where the high strains and poor temperature resistance would limit the field of application. The introduction of covalent solids must be accompanied by a new method of ensuring toughness described in another paper (Cook and Gordon, Proc.Roy.Soc. A. 282. 508, 1964).

AD-612 604 Div. 14, 20
CFSTI Prices: HC$3.00 MF$0.75

General Dynamics/Fort Worth, Tex.
THE EFFECTS OF REACTOR RADIATION ON THE PHYSICAL PROPERTIES OF TWO RADIATION-RESISTANT O-RING COMPOUNDS,
Final rept. for 1 Oct 63-30 Sep 64,
by J. H. Lewis, P. M. Johnson, and M. R. Self.
Jan 65, 82p Rept. no. FZK-196
Contract AF29 601 6213, Proj. 6773, Task 677302
WL TR-64-133

Unclassified report

Descriptors: (*O-rings, Radiation damage), (*Elastomers, Radiation damage), (*Radiation damage, O-rings), Styrene plastics, Acrylonitrile polymers, Tensile properties, Hardness, Compressive properties, Weight, Density, Deformation.

Two O-ring compounds specially formulated for radiation resistance - PRPC 1387 and PRPC 4387 (Acrylonitrile-Butadiene) (Styrene-Butadiene) - were irradiated to six gamma dose levels in the range of from 4.9 x 10 to the 8th power to 1.5 x 10 to the 11th power ergs/gm(C). O-rings, tensile specimens, and compression-set buttons of both materials were irradiated in air at (or near) room temperature. O-rings of PRPC 1387 were also irradiated in oil. Tensile properties, hardness, compression set, weight change, and specific gravity were measured as a function of radiation dose. Several analytical procedures were used in interpreting the data. The wide range of doses employed in the experiment provides an accurate assessment of degradation produced by radiation. The highest dose resulted in complete loss of useful mechanical properties. The properties most adversely affected at lower doses were ultimate elongation, hardness, and compression set. However, both materials exhibit good radiation resistance and appear to be useful up to doses of at least 10 to the 10th power ergs/gm(C). (Author)

AD-612 728 Div. 14
CFSTI Prices: HC$1.00 MF$0.50

Textile Research Inst., Princeton, N. J.
SYNTHETIC FIBERS, 1965,
by J. H. Dillon. Mar 65, 15p
Technical rept. no. TR-5
Contracts Nonr418400, Nonr418401

Unclassified report

Rept. prepared for inclusion in the Encyclopedia of Chemistry (2 ed), Clark-Hawley (Reinhold Publishing Co.) which will appear in late 1965 or early 1966.

Descriptors: (*Fibers (Synthetic), Reviews), Glass textiles, Inorganic polymers, Viscose, Rayon, Acetates, Proteins, Alginic acid, Nitrocellulose, Cellulose acetates, Polyamide plastics, Acrylic resins, Vinyl plastics, Polyester plastics, Polyethylene plastics, Isocyanate plastics, Halocarbon plastics.

The following groups of fibers are each briefly discussed: Glass and other inorganic fibers, viscose rayon, cuprammonium rayon, saponified acetate rayon, alginate rayon, regenerated protein fibers, cellulose nitrate, cellulose acetate rayon, cellulose triacetate, polyamides, acrylics, modacrylics, polyvinyls, polyvinylidenes, polyesters, polyolefins, polyurethanes, fluorocarbons.

AD-612 732 Div. 14
CFSTI Prices: HC$0.75 MF$0.50

Rock Island Arsenal, Ill.
INVESTIGATION OF VOLATILE CORROSION INHIBITOR ADDITIVES FOR STANDARD OPERATING OILS TO IMPROVE THEIR PRESERVATIVE CHARACTERISTICS,
by Joseph H. Weinberg and Gerald Pributsky.
21 Dec 64, 24p Rept. no. 64-3577
Proj. 1C024401A109

Unclassified report

This rept. was prepared by Springfield Armory under contract to Rock Island Arsenal.

Descriptors: (*Lubricant additives, Corrosion inhibition), (*Corrosion inhibition, Lubricant additives), (*Oils, Preservation), Vapors, Compatibility, Storage, Viscosity, Flammability, Hydraulic fluids.

Nine volatile corrosion inhibitor (VCI) concentrates were evaluated in eight selected base oils to determine the feasibility of utilizing a VCI concentrate to improve the preservative properties of operating lubricants. The work reasonably demonstrated the feasibility of using carefully selected concentrates to improve the preservative properties of an operating lubricant. However, unpredictable compatibility problems may prevent a practical application of this process. Three promising concentrates were found that would provide vapor phase protection comparable to that of Specification MIL-L-46002 VCI oil, and exhibited only slight

sedimentation in compatibility tests with operating lubricants. Of the three, only one had the supply and logistics properties deemed to be most desirable. It was revealed that concentrates in liquid form were best suited because solubility problems were encountered with the powdered form of concentrate. The type of diluent which is part of the concentrate can also produce detrimental effects on a product when it is added to an operating oil as evidenced by drastic changes in viscosity, pour point and flash point. (Author)

AD-612 763 Div. 14, 26, 30
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHODS OF TESTING COMPONENTS AND MATERIALS OF MACHINES AND INSTRUMENTS, 1961, no. 1 (SELECTED ARTICLES)
28 Jan 65, 35p FTD-MT-64-247
TT 65-61843

Unclassified report

Edited machine trans. of Metody Ispytanii Detalei Mashin i Priborov (USSR) 1961, no. 1, p. 17-46.

Descriptors: (*Materials, Antifriction bearings), (*Friction, Materials), (*Machines, Antifriction bearings), (*Antifriction bearings, Materials), Transmission gears, Stainless steel, Iron, Castings, Surface properties, Hardness, Carbon, Graphite, Impregnation, Lead alloys, Copper.

Contents: Question about selection of materials for open-toothed transmissions working without lubricant in aggressive media, by T. T. Belousova and S. F. Fonarev; Experimental investigation of antifriction properties of carbon and graphite base materials working in conditions of dry friction, by S. F. Fonarev, A. A. Kul'bakh, and V. A. Dzhonson (Johnson); Investigation of antifriction properties of materials based on graphite of brands AG1500-B83 and AG1500-CU, working in conditions of dry friction, by S. F. Fonarev, A. A. Kul'bakh, and V. A. Dzhonson (Johnson).

AD-612 774 Div. 14, 12, 25
CFSTI Prices: HC$1.00 MF$0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECTS OF VACUUM-ULTRAVIOLET ENVIRONMENT OF THE OPTICAL PROPERTIES OF BRIGHT ANODIZED ALUMINUM.
Rept. for 1 Jan 63-1 Aug 64,
by James H. Weaver. Jan 65, 23p ML TR-64-355
Proj. 7340, Task 734007

Unclassified report

Descriptors: (*Space environmental conditions, Aluminum), (*Aluminum, Coatings), (*Coatings, Aluminum), (*Protective treatments, Aluminum), Optical properties, Temperature control, Environmental tests, Ultraviolet radiation, Low pressure research, Degradation, Thermal radiation, Vacuum, Color centers, Absorption, Aluminum compounds, Oxides.

The rapid increase in space vehicle design reliability and lifetime requirements has created a serious problem in the selection of materials for passive temperature control. The major difficulty is the prediction of the degradation of the thermal radiation properties of these materials under the space environment. Bright anodized aluminum coatings are known to possess the desired optical properties for passive temperature control and are being considered for space vehicle application. The effects of the vacuum-ultraviolet environment on the optical properties of bright anodized aluminum have been determined. The optical properties of the bright anodized aluminum system are only slightly altered by ultraviolet radiation in air. However, the combined vacuum-ultraviolet radiation is the most detrimental to the reflectance of bright anodized coatings prepared by the sulfuric acid process. The color centers formed during exposure causes a gradual increase in absorption up to 120 hours exposure. This increase in solar absorption causes the alpha sub s/epsilon ration to increase to 0.42 after approximately 120 hours exposure, but after this change, very little further change is noted, unlike most organic and inorganic coatings. (Author)

AD-612 808 Div. 14, 17, 26
CFSTI Prices: HC$1.00 MF$0.50

Defense Metals Information Center, Columbus, Ohio.
SUMMARY OF THE MEETING (9th) OF THE REFRACTORY COMPOSITES WORKING GROUP,
by E. S. Bartlett and H. R. Ogden. 3 Mar 65, 25p
Memo. DMIC-200
Contract AF33 615 1121, Proj. 8975

Unclassified report

Meeting held at the Norton Co., Worcester, Mass., 18-20 Aug 64.
See also AD-602 476.

Descriptors: (*Refractory materials, Symposia), (*Composite materials, Refractory materials), (*Coatings, Refractory materials), Refractory metals, Refractory metal compounds, Oxides, Coatings, Protective treatments, Graphite, Mechanical properties, Ablation, Ceramic materials, Plastics, fiber metallurgy, Porous materials, Rocket components, Flame spraying, Vapor plating, Power metallurgy, Joining, Oxidation, Bearings, Environmental tests, Niobium alloys, Turbine blades, Reentry vehicles.

This memorandum summarizes information on refractory materials and composites as presented at the Ninth Meeting of the Refractory Composites Working Group in Worcester, Massachusetts, on August 18-20, 1964. This memorandum is based on 49 papers covering a wide variety of subjects ranging from basic studies on oxidation mechanisms to the development of specific pieces of hardware. The papers are reviewed and discussed briefly within the framework of the following four broad areas: materials technology, process technology, specific hardware applications, and evaluation techniques. Included in the section on materials technology are discussions dealing with bulk refractory materials and coated-metal systems. Hot spraying, chemical vapor deposition, powder processes, and joining are discussed in the section on process technology. The specific hardware applications cover rocket-motor components, nose caps, leading edges, and hot skins. (Author)

AD-612 880 Div. 14
CFSTI Prices: HC$3.00 MF$0.75

Watervliet Arsenal, N. Y.
BONDING STRESSES ON MICROFIBERS SUBJECT TO TRANSVERSE FLOW OF HEAT.
Technical rept.,
by M. A. Sadowsky and M. A. Hussain. Mar 65, 81p
Rept. no. WVT-6503
Proj. 1C014501B32A

Unclassified report

Descriptors: (*Composite materials, Fibers), (*Fibers, Composite materials), Stresses, Mathematical analysis, Bonding, Elasticity, Heat transfer, Deformation.

A linear temperature field with a resulting uniform flow of heat through an uninhibited (with respect to deformation) matrix medium produce a spherical bending deformation of the medium free from any stresses whatsoever. However, if a foreign body such as a stiff microfiber is embedded in the matrix the body will resist bending in conformity with the matrix and thus give rise to a local stress field. Depending upon the shape and size of the microfiber, this stress field may lead to the destruction of the bond between the microfiber and the matrix. The exact determination of bonding stresses between matrix and microfiber has been obtained for a prolate spheroidal microfiber using three dimensional Boussinesq potentials and thermoelastic bipotentials. The bonding stresses have been evaluated on a Univac Solid State (80) computer for various spheroidal shapes. (Author)

AD-612 907 Div. 14, 30
CFSTI Prices: HC$3.00 MF$0.75

Fluid Power Controls Lab., Oklahoma State Univ., Stillwater.
DECONTAMINATION OF HYDRAULIC FLUIDS AND DYNAMIC HOSE STUDY.
Final rept. for 3 Jan 64-3 Jan 65.
Jan 65, 75p
Contract AF33 657 9958, Proj. 912A
SEG TR-64-74
Unclassified report

See also AD-603 702.

Descriptors: (*Hydraulic fluids, Decontamination), (*Centrifuges, Design), Test equipment, Tests, Hydraulic fluid filters, Supports, Hoses, Impurities, Test methods, Life expectancy, Compatibility, Reliability, Maintainability, Ground support equipment.

The report includes a description of the installation of the prototype hydroclone on standard hydraulic test stands as a means of upgrading the decontamination capabilities in USAF ground support equipment. The acquisition of hydraulic fluid samples from the field installations and the laboratory tests of these samples are discussed along with a technical comment on the results of the various analyses. A comparison of filtration performance of the hydroclone and the final filter presently being used on the hydraulic test stands is presented. Studies on field test units are presented which were conducted to determine the maintainability, compatibility endurance limits, reliability, and service life of the hydroclone and its critical components. A recommended test procedure is presented for the verification of hydroclone performance and the establishment of qualification requirements for quantity production. General design criteria curves for optimum hydroclones are given which can be used to design a hydroclone, using MIL-F-5606 hydraulic fluid, to separate specific sizes and densities of various contaminants found in USAF ground support equipment. A unique method for the dynamic testing of high pressure hose assemblies and the cleaning of new hose assemblies is presented along with the contaminant generating characteristics of high pressure hoses constructed of various materials. (Author)

AD-612 934 Div. 14, 25
CFSTI Prices: HC$1.00 MF$0.50

Texas Instruments, Inc., Dallas.
NEW HIGH TEMPERATURE INFRARED TRANSMITTING GLASSES.
Quarterly technical rept. no 2, 1 Aug-30 Sep 62.
9 Oct 62, 8p
Contract Nonr381000
Unclassified report

See also AD-440 439.

Descriptors: (*Glass, Infrared optical materials), (*Infrared optical materials, Glass), (*Infrared windows, Glass), Silicon, Antimony, Selenium, Chalcogens, Phase studies, Refractive index, Hardness, Degradation, Absorption, High-temperature research, Light transmission, Experimental data.

The chalcogenide glass system studied this quarter was formed from silicon (Group IV element), antimony (Group V element), and selenium (the chalcogen). The system was studied in essentially the same manner as the silicon-antimony-sulfur system reported in the first quarterly report. The results obtained from 42 samples of different composition are given. All sample numbers of compositions that formed glasses are marked with an asterisk. The measured and corrected softening points of each glass are given and range from a maximum of 490 C down to a minimum value of 163 C for a 85% selenium glass. The softening points were measured using the apparatus described. (Author)

AD-612 951 Div. 14, 25, 26, 31
CFSTI Prices: HC$3.00 MF$0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
STUDY OF RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
Quarterly progress rept. no. 3, 30 Dec 64-30 Mar 65, by F. E. Stone. Mar 65, 64p Rept. no. SM-47833
Contract NObs90301,Proj. R007 03 04, Task 1008
Unclassified report

See also AD-609 610.

Descriptors: (*Laminated plastics, Filament wound construction), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), (*Filament wound construction, Composite materials), (*Glass textiles, Reinforcing materials), Stresses, Mathematical analysis, Cylindrical bodies, Mandrels, Plastics, Rings, Deformation, Winding, Manufacturing methods, Tensile properties.

The purpose of this program is to determine the presence and magnitude of residual stresses in thick wall fiberglas structures, and their effect on material properties; such that, the information will be applicable to full size deep submergence structures, and detrimental effects may be minimized or eliminated. Analyses of residual radial and circumferential stresses are compared and reported for 14 dispersed construction cylinders and 32 all hoop scaling rings. Test and theory are compared relative to bending stiffness of the cylinders and to provide insight as to the relative importance of the fabrication effects which influence the final residual stresses. (Author)

AD-612 959 Div. 14, 26
CFSTI Prices: HC$4.00 MF$1.00

Rutgers - The State Univ., New Brunswick, N. J. School of Ceramics.
DEVELOPMENT OF REFRACTORY CERAMICS THAT CAN BE PROCESSED AT TEMPERATURES CONSIDERABLY

LOWER THAN THEIR MAXIMUM USE TEMPERATURE.
Final rept.,
by Edward J. Smoke and John H. Koenig. 31 Dec 64, 127p
Contract NOw64 0040d
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Ceramic materials, Manufacturing methods), Refractory materials, High-temperature research, Radomes, Sintering, Aluminum compounds, Oxides, Spinels, Magnesium compounds, Additives, Silicon compounds, Calcium compounds, Minerals, Density, Dielectric properties, Physical properties, Aging (Materials).

The effort was divided into three temperature ranges. In the highest 3000F and high, the sintering characteristics of pure alumina, and plus additives, and pure spinel were studied. Pure alumina plus minor additions of magnesia have attained maturity at 2840F. Matured spinel has been realized at 2650F. In the temperature range 2600 to 3000F the presintered approach to the prereacted materials technique was used. Compositions in the high alumina portion of the CaO.Al2O3.SiO2 system were evaluated and compared to the earlier work in the MgO.Al2O3.SiO2 system. Properties, mechanisms and structure were discussed. In the lowest temperature range the devitrification approach to the prereacted raw materials technique was utilized. Cordierite (2MgO.2Al2O3.5SiO2) was the crystalline phase studied. Two approaches were used. In the first the whole composition is fritted and used as the sole raw material from which specimens were prepared. Compositions in the MgO.Al2O3.SiO2 system were studied. In the second, two devitrifiable frits are prepared and used.

AD-612 979 Div. 14, 4, 25

Explosives Research and Development Establishment, Waltham Abbey (England).
POLYMER MOLECULAR STRUCTURE AND MECHANICAL PROPERTIES.
Revised ed.,
by J. Roberts. 14 Aug 64, 11p Offprint no. 65/1
Unclassified report

Pub. in Philosophical Magazine (Gt. Brit.) v11 (ser. 8) n109 p1-9 Jan 1965 (Copies available only to DDC users).
Revision of rept. dated 8 Jun 64.

Descriptors: (*Polymers, Molecular structure), (*Plastics, Mechanical properties), (*Molecular structure, Polymers), Polyethylene plastics, Styrene plastics, Acrylic resins, Deformation, Brittleness, Fracture (Mechanics), Elasticity.

The theoretical problem of relating the mechanical properties of a polymer to molecular structure is considered for the simplest case where an amorphous polymer is subjected to a hydrodynamic stress system at high rates of deformation. The theoretical basis is that under such conditions the mechanical properties can be attributed to the London forces between nearest atoms on neighbouring chain molecules. For the amorphous polymers polymethylmethacrylate and polystyrene the calculations give room temperature values of maximum bulk modulus, triaxial and uniaxial brittle fracture strengths and probable brittle fracture strain. Theoretical values of bulk modulus are also obtained for polyethylenes of various degrees of crystallinity by considering strain in the amorphous regions only. It is indicated how time dependent or viscoelastic effects might be introduced into the analysis to describe mechanical properties at much lower rates of deformation. (Author)

AD-612 992 Div. 14, 4

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
INFRARED SPECTROSCOPIC STUDIES OF GRAFTED CELLULOSE,
by Sharda DasGupta. 1964, 7p AECL-2087
Unclassified report

Pub. in Canadian Spectroscopy v10 n1 np Jan 1965 (Copies available only to DDC users).
Rept. presented at the Ottawa Symposium on Applied Spectroscopy (11th), 9-11 Sep 64.

Descriptors: (*Cellulose, Copolymerization), (*Copolymerization, Cellulose), (*Polymerization, Cellulose), (*Infrared spectroscopy, Cellulose), Cotton textiles, Paper, Degradation, Radiation damage, X-rays, Chemical bonds, Acrylic resins, Vinyl plastics, Styrene plastics, Canada.

New techniques have been developed for grafting monomers such as styrene and methyl methacrylate onto cotton fabrics and paper under the influence of gamma radiation. The products have vastly improved properties. The mechanisms of the grafting reaction, the probable active sites and the quality of the products have been studied at various stages by infrared spectroscopic techniques. Such studies have made it possible to follow the reactions and thus obtain desired properties. Spectra of the deuterated grafted products revealed that grafting takes place at the free and intermolecular hydrogen bonded regions. A possible reaction mechanism indicating the role of short lived and long lived free radicals is discussed. A structure of the grafted network has been proposed. (Author)

AD-613 009 Div. 14, 8
CFSTI Prices: HC$2.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
EVALUATION OF THERMAL STRESS RESISTANCE IN POTENTIAL RADOME MATERIALS.
Final rept.,
by David A. Brown. 15 Feb 65, 49p
Contract Nonr421300X, Proj. PMU4538
Unclassified report

See also AD-606 671.

Descriptors: (*Ceramic materials, Thermal stresses), (*Radomes, Ceramic materials), (*Thermal stresses, Ceramic materials), (*Shock resistance, Ceramic materials), Heat-resistant glass, Aluminum compounds, Oxides, Magnesium compounds, Fracture (Mechanics), Heating, Thermal conductivity.

The relative thermal stress resistance of five potential radome materials was experimentally determined for heating conditions which simulated radome environments. The effects of wall thickness and notches were also studied. Pyroceram 9608 was found to be the most thermal stress resistant of the five materials studied; the others, in decreasing order of merit, were Pyrex 7740, AD-99 alumina, MgO (99+% dense), Alundum RA-3360. The effects of notches and of the wall thicknesses studied (1/4 inch and 3/8 inch) were small compared with the differences between materials. However, theoretical considerations, together with extrapolation of experimental results, indicated that considerable improvement in thermal stress resistance might be obtained from much smaller wall thicknesses (0.10 inch or less). A fair correlation was obtained between the experimental results and four pertinent parameters. Pyroceram 9608 ranked as the most thermal stress resistant material in the ratings obtained from all four parameters. (Author)

AD-613 014 Div. 14
CFSTI Prices: HC$2.00 MF$0.50

Naval Research Lab., Washington, D. C.
EFFECTS OF GAMMA RADIATION ON DIELECTRIC PROPERTIES OF POLYETHYLENE TEREPTHALATE.
Progress rept.,
by F. J. Campbell. 6 May 63, 26p
Miscellaneous paper no. NRL-MP-798

Unclassified report

Descriptors: (*Polyester plastics, Dielectric properties), (*Phthalates, Polyester plastics), (*Gamma rays, Polyester plastics), (*Radiation damage, Gamma rays), Degradation, Electric insulation, Measurement, Films, Electrodes, Paints, Silver, Encapsulation, Styrene plastics, Alkenes.

It is possible to observe the degradation of polyethylene terepthalate film as a function of radiation exposure through measured changes of dielectric properties. The induced conductivity of air at atmospheric pressure prohibits the use of exposed electrodes or bare wires in a system for conducting measurements in the radiation field. By utilizing a system of conductive silver paint electrodes, a guarded circuit, and encapsulation of all conductors and contacts, it was possible to conduct reliable measurements in the radiation field. However, with the polystyrene and other organic materials used in the specimen holder, it is not possible to monitor these measurements in the radiation field continuously or to conduct similar measurements at elevated temperatures. The decrease in background leakage currents at low ambient pressures encourages further study toward the development of a system for continuous measurement in radiation. (Author)

AD-613 019 Div. 14, 12
CFSTI Prices: HC$0.50 MF$0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DEVELOPMENT OF A LOW COST SOLAR HEAT REFLECTING AND LOW VISIBILITY COATING.
Final rept.,
by Melvin H. Sandler. 10 Mar 65, 19p
Rept. no. CCL-178
Proj. IC024401A329

Unclassified report

Descriptors: (*Ceramic coatings, Guided missiles), (*Guided missiles, Coatings), Solar radiation, Reflection, Visibility, Costs, Effectiveness, Protective treatments.

This report covers the development of an experimental low cost green solar reflectant and low visibility coating for use on missile systems. The currently specified enamel based on a special and single source pigment, cobalt titanate, has a raw material cost of approximately $9 per gallon compared to $1.50 per gallon for the experimental material. In addition the test data indicated the experimental material to have a 2 - 3F. advantage over the currently specified material. Exterior exposure and field tests are in progress. (Author)

15. Mathematics

AD-612 456 Div. 15, 30

Rias, Inc., Baltimore, Md.
A REMARK ON A RESULT OF LEFSCHETZ,
by K. R. Meyer. 29 Apr 64, 3p
Contracts AF49 638 1242, NASw845
AFOSR 65-0319

Unclassified report

Pub. in Contributions to Differential Equations (U. S.) v3 p435-7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stability, Control systems), (*Control, Theory), Matrix algebra, Differential equations, Functions, Real variables, Determinants.

AD-612 470 Div. 15, 2
CFSTI Prices: HC$1.00 MF$0.50

Brown Univ., Providence, R. I.
EXTENSIONS TO THEORY OF TIME SERIES ANALYSIS.
Quarterly rept. no. 10, 1 Nov 64-31 Jan 65,
by Walter Freiberger. 31 Jan 65, 4p
Contract DA36 039sc87222, Proj. 3A99 25 002

Unclassified report

See also AD-601 745.

Descriptors: (*Statistical analysis, Weather forecasting), (*Weather forecasting, Statistical analysis), Stochastic processes, Series, Mathematical models, Meteorological parameters.

AD-612 476 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
IGNORING THE SINGULARITY IN APPROXIMATE INTEGRATION,
by Philip J. Davis and Philip Rabinowitz.
20 Feb 65, 28p
Contract Nonr56236

Unclassified report

Descriptors: (*Integration, Numerical analysis), (*Numerical analysis, Integration), Theory, Functions, Number theory, Algebra, Computers.

Computing machines have recently given prominence to a primitive method of obtaining the values of a singular integral. In this method, one merely applies an ordinary rule of approximate integration and ignores the singularity. This paper is a study of the theoretical and numerical aspects of this method. It is found that on the whole, the method is theoretically sound and good answers can be obtained. But there are also cases in which answers cannot be obtained and borderline cases in which it may not be clear after a lengthy computation what value should be accepted as the answer. (Author)

AD-612 478 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. School of Humanities and Sciences.
THE DIFFERENCE CORRECTION METHOD FOR NON-LINEAR TWO-POINT BOUNDARY VALUE PROBLEMS,
by Victor Pereyra. 25 Feb 65, 42p
Technical rept. no. CS-18
Contract Nonr22537, Proj. NR044 211

Unclassified report

Descriptors: (*Boundary value problems, Numerical analysis), (*Numerical analysis, Boundary value problems), (*Difference equations, Boundary value problems), Iterative methods, Corrections.

The numerical solution of non-linear two-point boundary value problems is discussed. It is shown that for a certain class of finite difference approximations the a posteriori use of a difference correction raises the order of the approximation by at least two orders. The difference correction itself involves only the solution of one system of linear equations. If Newton's method is used in the early stage, then it is shown that the matrices in both processes are identical, which is a useful feature in coding the method for an automatic computer. Several numerical examples are given. (Author)

AD-612 479 Div. 15, 26
CFSTI Prices: HC$2.00 MF$0.50

Columbia Univ., New York. School of Engineering and Applied Science.
MINIMUM COST REPLACEMENT UNDER MARKOVIAN DETERIORATION.
Technical rept. no. 26, Jul 63-Sep 64,
by Peter J. Kolesar. 1 Feb 65, 46p
Contract Nonr26655; Grant NSF GP2202,
Proj. NR042 099

Unclassified report

Descriptors: (*Replacement theory, Costs), (*Optimization, Replacement theory), (*Management control systems, Statistical processes), Management engineering, Failure (Mechanics), Linear programming, Operations research, Decision theory.

Optimal replacement programs for equipment subject to Markovian deterioration are considered. Interest is in determining the structure of the replacement policies that minimize the long run average costs. In particular, conditions under which control limit replacement rules are optimal are determined. In addition results are obtained indicating that linear programming is an efficient method for computing optimal policies. (Author)

AD-612 526 Div. 15

Syracuse Univ., N. Y.
ON A CLASS OF RIGHT ALTERNATIVE RINGS,
by Erwin Kleinfeld. 15 Mar 64, 6p
AROD 3901-6

Unclassified report

Pub. in Mathematische Zeitschrift (Germany) v87 p12-6 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Groups (Mathematics), Identities), (*Identities, Groups (Mathematics)), Algebras, Theorems, Rings.

The commutator and associator are defined by $(x,y)=xy-yx$, and $(x,y,z)=(xy)z-x(yz)$, respectively. A ring is said to be right alternative if all of its elements satisfy the identity $(x,y,y)=0$. A ring is defined to be of type (-1, 1) in case it is right alternative and also Lie-admissible, which is to say that it satisfies the identity $(x,y,z)+(y,z,x)+(z,x,y)=0$. The present work is concerned

with a more specialized class than (-1, 1) rings, namely the class of right alternative rings which satisfies also the identity (x,y),z)=0. Characteristic different from 2 and 3 are tacitly assumed. Then the theorem, a simple ring R with idempotent is a field if and only if R is right alternative and satisfies the above identity, is proven.

AD-612 527 Div. 15, 25

Defense Research Corp., Santa Barbara, Calif.
SOME REMARKS CONCERNING A PATHOLOGICAL MATRIX OF INTEREST IN THE INVERSE-SCATTERING PROBLEM.
Revised ed.,
by Peter J. Redmond. 30 Jun 64, 9p
Contract DA31 124 AROD94
AROD 4157-2

Unclassified report

Pub. in Journal of Mathematical Physics (U. S.) v5 n11 p1547-54 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Matrix algebra, Quantum mechanics), (*Quantum mechanics, Scattering), Phase shift, Vector analysis, Series.

A Hermitian matrix which occurs in the theory of the quantum-mechanical inverse-scattering problem has apparently contradictory properties. It has a well-behaved inverse in spite of having zero as one of its eigenvalues. The properties of the matrix are investigated and the relevance of the results to the theory are discussed. (Author)

AD-612 531 Div. 15

RIAS, Inc., Baltimore, Md.
ON THE FOUNDATIONS OF TRANSFER FUNCTION ANALYSIS,
by Leonard Weiss. 4 Dec 63, 23p
Contract DA36 034ORD3471X
AROD 2603-17

Unclassified report

Pub. in International Journal of Engineering Science (U. S.) v2 p343-65-1964 (Copies available only to DDC users).
Prepared in cooperation with Johns Hopkins Univ., Baltimore, Md., Contract Nonr24853.

Descriptors: (*Functions, Integral transforms), (*Integral transforms, Functions), Operators (Mathematics), Differential equations, Functional analysis, Theorems, Boundary value problems, Series.

This paper presents an approach to the integral transform analysis of linear differential systems which is based on the expansion theorem of Weyl, Stone, Titchmarsh, and Kodaira (W-S-T-K). The problem is essentially to find an integral transform which is compatible with the canonical operator of a given class of systems. If this can be done, then the differential equation of any member of that class can be converted into an algebraic equation in the transform demain. The relevence and range of applicability of the W-S-T-K theory to the above problem are discussed. The usefulness of this approach is emphasized by the fact that, when it is applicable, it provides not only an answer to the question of whether a compatible integral transform exists, but also provides an explicit procedure for deriving the transform. Two examples illustrating the theory are given. The first is a derivation of a transform which includes the Fourier, two-sided Laplace, and various versions of the Mellin transform as special cases. The second is a derivation of the Hankel transform. (Author)

AD-612 565 Div. 15

Syracuse Univ., N. Y.
ON THE ZEROS OF f(g(z)) WHERE f AND g ARE ENTIRE FUNCTIONS,
by Albert Edrei and Wolfgang H. J. Fuchs.
10 Jul 63, 16p
Contract AF49 638 571
AFOSR 65-0348

Unclassified report

Pub. in Journal d'Analyse Mathematique (Israel) v12 p243-55 1962 (Copies available only to DDC users)
Prepared in cooperation with Cornell Univ., Ithaca, N. Y., Grant NSF G18837.

Descriptors: (*Functions, Number theory), (*Number theory, Functions), Polynomials, Power series, Inequalities, Algebra, Theorems.

AD-612 570 Div. 15, 30

RIAS, Inc., Baltimore, Md.
AN IMPLICIT FUNCTION THEOREM WITH AN APPLICATION TO CONTROL THEORY,
by Richard Datko. 24 Feb 64, 8p
Contract DA36 034AMC0221X
AROD 2603-18

Unclassified report

Pub. in Michigan Mathematical Journal (U. S.) v11 p345-51 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Control, Theory), (*Functions, Theorems), Measure theory, Mapping (Transformations), Set theory, Algebraic topology, Nonlinear systems, Optimization, Time.

AD-612 584 Div. 15

Washington Univ., St. Louis, Mo.
THE MARCINKIEWICZ INTERPOLATION THEOREM,
by R. A. Hunt and Guido Weiss. 6 Jul 64, 5p
Contract DA31 124AR0 D58
AROD 3076:7

Unclassified report

Pub. in American Mathematical Society. Proceedings (U. S.) v15 n6 p996-8 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Operators (Mathematics), Theorems), (*Functional analysis, Operators (Mathematics)), Numerical analysis, Inequalities, Measure theory.

It is shown that the Marcinkiewicz Theorem on the interpolation of operators acting on L (p) spaces is an immediate consequence of two easily proved inequalities.

AD-612 585 Div. 15

Washington Univ., Seattle.
AN EXTENSION OF THE MARCINKIEWICZ INTERPOLATION THEOREM TO LORENTZ SPACES.
Doctoral thesis,
by Richard A. Hunt. 22 Jun 64, 6p
Contract DA31 124ARO D58
AROD 3076:6

Unclassified report

Pub. in American Mathematical Society. Bulletin (U. S.) v70 n6 p803-7 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Operators (Mathematics), Functional analysis), (*Functional analysis, Operators (Mathematics)), Theorems, Numerical analysis, Inequalities.

The paper serves three purposes. First, the theorem of Marcinkewicz on interpolation of operators is generalized to Lorentz spaces. Second, this result is shown to be a rather easy consequence of a celebrated inequality of Hardy. Third, previous open questions concerning the Marcinkiewicz theorem are settled by showing that the given result is the best possible.

AD-612 601 Div. 15
CFSTI Prices: HC$4.00 MF$1.00

Operations Research Center, Mass. Inst. of Tech., Cambridge.
MARKOVIAN DECISION PROCESSES WITH UNCERTAIN TRANSITION PROBABILITIES,
by John M. Gozzolino, Romulo Gonzalez-Zubieta, and Ralph L. Miller. Mar 65, 116p Technical rept. no. TR-11
Contract Nonr184187, Proj. NR042 230
Unclassified report

Report on Research in the Control of Complex Systems.

Descriptors: (*Dynamic programming, Probability), (*Operations research, Statistical processes), Optimization, Decision theory, Simulation, Management control systems, Sampling, Distribution theory.

A dynamic programming formulation for the Markovian decision process when transition probabilities are unknown is proposed. This formulation is used to solve simple problems, but is shown to be too difficult to apply to more complex systems. Various approximate methods are then proposed and discussed. A simple approximating algorithm is finally presented. (Author)

AD-612 648 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park.
HEREDITARY DEPENDENCE IN THE THEORY OF DIFFERENTIAL EQUATIONS, PART II,
by G. Stephen Jones. Mar 65, 48p
Technical note BN-391
Contract Nonr59517
Unclassified report

See also AD-610 842.

Descriptors: (*Differential equations, Theory), (*Difference equations, Differential equations), Functional analysis, Mapping (Transformations), Mechanics, Time-lag theory.

A general class of differential equations with hereditary dependence is introduced which includes most equations of hereditary type encountered in applications, with the notable exception of equations of neutral type. Furthermore, the class introduced allows the development of a strong and tractable qualitative theory closely resembling that of ordinary differential equations. Much of the linear analysis and the stability theory as developed by J. K. Hale for a more restricted class of hereditary equations carries over directly. However, only results associated with existence and uniqueness of solutions and dependence on initial data and parameters are considered.

AD-612 684 Div. 15, 30
CFSTI Prices: HC$1.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
THE AUTOMATIC INTEGRATION OF A FUNCTION WITH A PARAMETER.
Technical rept.,
by Philip Rabinowitz. Feb 65, 10p
Contract Nonr56236, Proj. NR044309
Unclassified report

Descriptors: (*Integration, Automatic), (*Numerical methods and procedures, Integration), Functions, Programming languages, Programming (Computers).

Two efficient methods for automatic numerical integration are Romberg integration and adaptive Simpson integration. For integrands of the form f(x)g(x,a) where a is a parameter, it is shown that Romberg's method is more efficient. A FORTRAN program shows how to achieve this greater efficiency.

AD-612 693 Div. 15, 8
CFSTI Prices: HC$2.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
SOLVING THE WIENER-HOPF EQUATION.
Scientific rept.,
by David A. Shnidman. Jan 65, 33p
AFCRL 65-44, PMSRP-74
Proj. 5628, Task 562801
Unclassified report

Descriptors: (*Integral equations, Communication theory), (*Statistical functions, Integral equations), (*Communication theory, Integral equations), Transformations (Mathematics).

The Wiener-Hopf equation is briefly derived and the method of solving, which is believed easiest to use, is presented. The solution is then specialized for the case where the message and input spectral densities are rational functions. (Author)

AD-612 697 Div. 15, 8
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SUFFICIENCY AND INFORMATION RATE OF MULTI-STAGE STATISTICAL TESTS,
by Julian J. Bussgang and Michael B. Marcus.
Feb 65, 26p Rept. no. RM-4405-ARPA
Contract SD79, ARPA Order 189 61
Unclassified report

Descriptors: (*Sequences, Statistical tests), (*Statistical tests, Optimization), (*Optimization, Statistical tests), Decision theory, Probability, Sequential analysis, Stochastic processes, Communication theory, Wave transmission.

In this memorandum some fundamental aspects of multi-stage tests of alternate statistical hypotheses are discussed. Section II is devoted to the formulation of the problem and the definition of the quantities of interest. Section III demonstrates certain fundamental equalities of the conditional distributions of the sample size which occur in Wald's sequential probability ratio test. These equalities, which to the authors' knowledge have not been noted before, imply that the terminal decision is a sufficient statistic for the estimation of the true hypothesis regardless of the terminal stage. In Section IV a further consequence of these equalities is demonstrated. Using information theoretic concepts, the rate of transmission of a statistical test is defined and a test procedure, constructed to satisfy these equalities, is shown to minimize this rate. The results in the memorandum provide an alternate approach to the study of the optimality of multi-stage tests of alternate statistical hypotheses and

suggest a criterion for designing such tests based on the conditional distributions of the sample size rather than on the average risk. (Author)

AD-612 699 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON THE SOLUTION OF POLYNOMIAL CONGRUENCES,
by Richard Bellman. Mar 65, 10p
Rept. no. RM-3898-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Number theory, Polynomials), (*Polynomials, Matrix algebra), (*Matrix algebra, Polynomials), Theory.

An alternative expression is presented for the number of solutions of the congruence of f(x) to O(p).

AD-612 716 Div. 15, 26
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. Dept. of Industrial Engineering.
OPTIMAL POLICY IN A DYNAMIC, SINGLE PRODUCT, NONSTATIONARY INVENTORY MODEL WITH SEVERAL DEMAND CLASSES,
by Arthur F. Veinott, Jr. 2 Mar 65, 38p
Technical rept. no. TR-2
Contract Nonr22577, Proj. NR347 010
Unclassified report

Descriptors: (*Inventory analysis, Optimization), (*Stochastic processes, Inventory analysis), Dynamic programming, Mathematical models, Operations research, Management planning, Stock level control, Costs.

A multiperiod single product nonstationary inventory problem is studied in which the system is reviewed at the beginning of each of a sequence of periods of equal length. The model has the following features. There are several classes of demand for the product in each period. The demands in different periods are independent but not necessarily identically distributed. The cost structure is nonstationary with the ordering cost being proportional to the amount ordered. Conditions are given that ensure that the base stock ordering policy is optimal and that the base stock levels in each period are easy to calculate. The results are based on earlier work of the author and on properties of stochastically ordered distributions that are developed in the paper. The case of a linear holding cost and a linear storage cost is studied in detail. (Author).

AD-612 772 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Technion - Israel Inst. of Tech., Haifa.
ON HOMEOMORPHISMS.
Final technical rept.,
by M. Reichaw (M. Reichbach). Sep 63, 30p
Contract N62558 3315
Unclassified report

Descriptors: (*Topology, Functional analysis), (*Mapping (Transformations), Topology), Sequences, Real numbers, Set theory.

The report is concerned with sequences of homeomorphic spaces, the extension of homeomorphisms in lacunar spaces; and some conditions under which the limit of f sub i of X, as i approaches infinity, is homeomorphic with X.

AD-612 779 Div. 15, 8
CFSTI Prices: HC$2.00 MF$0.50

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
ESTIMATION OF SPECTRAL CHARACTERISTICS FOR A CLASS OF NON-STATIONARY TIME SERIES,
Final rept.,
by Melvin Hinich. Feb 65, 28p Rept. no. MSRR-34
Contract Nonr76024, Proj. NR047 048
Unclassified report

Prepared in cooperation with Bell Telephone Labs., Inc., Whippany, N. J.

Descriptors: (*Statistical analysis, Series), (*Series, Statistical analysis), Functional analysis, Measure theory, Probability, Statistical functions, Communication theory, Fourier analysis.

This paper deals with time series which are stationary in the mean but which have a nonstationary convariance function which is described by a certain parametric model. The non-stationarity results from changes over time of the parameters in the model. The first part of this paper discusses the concepts of stationarity, covariance, and the spectrum. The concept of temporal spectrum is introduced and applied to the analysis of the nonstationary time series. The second part deals with the parametric model. Statistics related to the rate of zero-axis crossings and the rate of relative maxima and minima of the time series are used to estimate the parameters in the model. These estimates are easy to compute from discrete observations of the time series. Expressions for the variances of these estimators are given as a function of the parameters and the sampling period. (Author)

AD-612 793 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
SERIES REPRESENTATION OF CONTINUOUS FUNCTIONS.
Technical information series,
by M. Wachman. Mar 65, 26p Rept. no. R65SD5
Unclassified report

Descriptors: (*Functions, Series), (*Series, Functions), Numerical analysis, Sequences, Polynomials, Tylor's series.

AD-612 796 Div. 15, 8
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A METHOD FOR POWER SPECTRUM PARAMETER ESTIMATION,
by M. Joseph Levin. 10 Feb 65, 33p
Group rept. no. 1965-8
Contract AF19 628 500, ARPA Order 512
ESD TDR-65-48
Unclassified report

Descriptors: (*Stochastic processes, Fourier analysis), (*Fourier analysis, Stochastic processes), Series, Time, S-matrix, Inequalities, Communication theory, Functional analysis.

An asymptotic analysis is carried out for an approximate method of estimating the parameters of the power spectrum of a zero-mean stationary Gaussian random process from an observed realization of limited duration. Maximum likelihood estimates are obtained with the approximation that the coefficients of the Fourier

series expansion of the realization are uncorrelated. This is equivalent to other approximation techniques which assume a periodic covariance function. The dispersion of the estimates is evaluated in terms of a quantity called the differential variance. It is shown that with this quantity as a criterion, the approximate estimates are as good, asymptotically, as the exact maximum likelihood estimates. An approximate expression for the differential variance in terms of the power spectrum is given and it is shown that this expression asymptotically approaches its exact value. These results follow from a general expression, obtained by means of a converse to the Schwarz inequality, which compares the differential variance of the approximate estimates with that of the maximum likelihood estimates. This expression is evaluated for the power spectrum parameter estimation problem in terms of the covariance matrix of the Fourier coefficients. The asymptotic behavior of these covariances is bounded so that the convergence of the elements of the inverse covariance matrix can be demonstrated. (Author)

AD-612 805 Div. 15, 2
CFSTI Prices: HC$1.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
A NOTE CONCERNING THE COLLINEAR LIBRATION CENTERS,
by Andre Deprit. Jan 65, 23p
Mathematical note no. MN-379, D1-82-0392
Unclassified report

Also available from the author.

Descriptors: (*N-body problem, Iterative methods), (*Interative methods, N-body problem), Polynomials, Equations, Power series, Projective geometry, Celestial mechanics.

The synodical barycentric abscissae of the collinear libration centers L sub 1 and L sub 2 are expanded in power series of the cubic root of the mass ratio up to the seventh order. A proof given by A. Wintner concerning an essential property of the characteristic exponents at the collinear Lagrangian points is shown to be wrong and is corrected. Through numerical computation for different values of the mass ratio, it is found that the absolute value of both characteristic exponents at L sub 1 and L sub 3 is a strictly increasing function of the mass ratio on the interval (0,1/2), while, at L sub 2, it is a strictly decreasing function. (Author)

AD-612 839 Div. 15

Princeton Univ., N. J.
H(p) CLASSES OF HOLOMORPHIC FUNCTIONS IN TUBE DOMAINS,
by E. M. Stein, Guido Weiss, and Mary Weiss.
14 Aug 64, 5p
Contract AF49 638 253
AROD 3076:11
Unclassified report

Pub. in National Academy of Sciences. Proceedings (U. S.). v52 n4 p1035-9 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Functions, Theory), Convex sets, Functional analysis, Integrals, Real variables, Complex variables, Topology.

AD-612 852 Div. 15

Cornell Univ., Ithaca, N. Y.
OPTIMUM EXTRAPOLATION AND INTERPOLATION DESIGNS, I,
by J. Kiefer and J. Wolfowitz. 1964, 31p
Contracts Nonr26604, AF18 600 685,
Proj. NR047 005
Unclassified report

Pub. in Institute of Statistical Mathematics. Annuals (Japan) v16 p79-108 1964(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Combinatorial analysis, Optimization), (*Mathematical prediction, Game theory), Numerical analysis, Polynomials, Analysis of variance, Measure theory.

For regression problems where observations may be taken at points in a set X which does not coincide with the set Y on which the regression function is of interest, the authors consider the problem of finding a design (allocation of observations) which minimizes the maximum over Y of the variance function (of estimated regression). Specific examples are calculated for one-dimensional polynomial regression when Y is much smaller than or much larger than X. A related problem of optimum estimation of two regression coefficients is studied. This paper contains proofs of results first announced at the 1962 Minneapolis Meeting of the Institute of Mathematical Statistics. No prior knowledge of design theory is needed to read this paper. (Author)

AD-612 868 Div. 15, 30

RIAS, Inc., Baltimore, Md.
WEIGHTING PATTERNS AND THE CONTROLLABILITY AND OBSERVABILITY OF LINEAR SYSTEMS,
by Leonard Weiss. 3 Apr 64, 6p
Contracts DA36 034AMC0221X, AF49 638 1206
AROD 2603:16
Unclassified report

Pub. in National Academy of Sciences. Proceedings (U. S.) v51 n6 p1122-7 Jun 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Differential equations, Linear systems), (*Linear systems, Control), Dynamics, Input-output devices, Functional analysis, Statistical mechanics.

AD-612 886 Div. 15, 28
CFSTI Prices: HC$7.00 MF$1.50

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
STUDIES IN RESEARCH METHODOLOGY. VI. THE CENTRAL LIMIT EFFECT FOR A VARIETY OF POPULATIONS AND THE ROBUSTNESS OF Z, t, AND F.
Final rept. for Sep 62-Nov 64,
by James V. Bradley. Dec 64, 301p
Rept. no. AMRL TR-64-123
Proj. 7184, Task 718401
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A Copy is available for public sale.
See also AD-411 439, AD-431 210.

Descriptors: (*Statistical tests, Theory), (*Performance tests, Statistical data), Probability, Sampling, Statistical analysis, Psychology, Test methods, Population (Mathematics), Human engineering.

The robustness of Z, t and F tests was studied by obtaining 1220 empirical sampling distributions (some of which were later combined) each consisting of 10,000

values of the test statistic obtained under a unique combination of sampling conditions. Conditions investigated, both alone and in combination, were: population shapes (nonnormal, normal, or some nonnormal and others normal), population variances (all sigma squared, or some sigma squared and others sigma squared/4), relative sample sizes (for two-sample tests N,N; 2N,N; 3N,N; or 2N,2N; for other multi-sample tests N,N,N; 2N,N,N; or N,N,N,N), and absolute sample size (N assumed values of 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, and in four special cases 2048 and 4096). Robustness at nominal significance levels of .05, .01, and .001 was examined for both left-, right- and two-tail tests. The Central Limit effect upon means of samples from populations differing considerably in shape and 'degree of nonnormality' was revealed in the robustness of certain Z statistics. (Author)

AD-612 896 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
PROGRAMMING UNDER UNCERTAINTY: THE EQUIVALENT CONVEX PROGRAM,
by Roger Wets. Feb 65, 41p
Mathematical note no. MN-392, D1-82-0411
Unclassified repor

Also available from the author.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-608 990.

Descriptors: (*Linear programming, Probability), (*Probability, Linear programming), (*Convex sets, Linear programming), Decision theory, Statistical functions, Matrix algebra.

This paper is an attempt to describe and characterize the equivalent convex program of a two-stage linear program under uncertainty. The study has been divided into two parts. In the first one, we examine the properties of the solution set of the problem and derive explicit expressions for some particular cases. The second section is devoted to the derivation of the objective function of the equivalent convex program. We show that it is convex and continuous. We also give a necessary condition for its differentiability and establish necessary and sufficient conditions for the solvability of the problem. Finally, we give the equivalent convex program of certain classes of programming under uncertainty problems, i.e. when the constraints and the probability space have particular structures. (Author)

AD-612 931 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

North Carolina State Coll., Raleigh.
RESEARCH IN MATHEMATICS.
Final rept. for 1 Jun 63-31 May 64.
16 Jun 64, 3p
Grant AF AFOSR444 63
AFOSR 64-1257
Unclassified report

Descriptors: (*Mathematics, Scientific research), (*Scientific research, Mathematics), Research program administration.

AD-612 937 Div. 15, 30
CFSTI Prices: HC$4.00 MF$0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A HEURISTIC PROGRAM THAT SOLVES SYMBOLIC INTEGRATION PROBLEMS IN FRESHMAN CALCULUS, SYMBOLIC AUTOMATIC INTEGRATOR (SAINT).
Doctoral thesis,
by James Robert Slagle. 10 May 61, 107p
Contract AF19 604 7400
Unclassified report

Descriptors: (*Programming (Computers), Integration), (*Integration, Programming (Computers)), Artificial intelligence, Digital computers, Mathematical logic, Character recognition.

Some ideas about problem solving by a machine were tried out on the nontrivial problem domain of elementary symbolic integration. To this end, the author programmed a large, high speed, general-purpose digital computer (I. B. M. 7090) to use these ideas to solve some symbolic integration problems. The computer so programmed is called 'SAINT', an acronym for 'symbolic automatic integrator'. SAINT performs symbolic integration which includes indefinite integration. It also performs definite and multiple integration when these are trivial extensions of indefinite integration. SAINT solves symbolic integration problems approximately at the level of a good college freshman and, in fact, uses many of the same methods (including heuristics) used by a freshman. Taking an average of two minutes per problem, SAINT solved fifty-two (ninety-sicx per cent) of the attempted fifty-four M.I.T. freshman calculus final examination problems. The author draws many conclusions from this and other experiments with SAINT and makes suggestions for future work in the field of Artificial Intelligence. (Author)

AD-612 943 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
A GRADIENT TECHNIQUE OF ADAPTIVE MONTE CARLO,
Professional paper,
by E. L. Pugh. 29 Jan 65, 22p Rept. no. SP-1921
Unclassified report

Descriptors: (*Monte Carlo method, Optimization), Sampling, Analysis of variance, Sequential analysis, Stochastic processes, Machines, Failure (Mechanics), Life expectancy.

A technique of Monte Carlo estimation is presented which is 'adaptive' in the sense that its efficiency increases as the sampling proceeds. It is based on sequentially estimating the gradient of the variance and following the path of steepest descent. The technique is applied to a problem of estimating the survival probability of a repairable machine. (Author)

AD-612 966 Div. 15
CFSTI Prices: HC$3.00 MF$0.75

Operations Research Center, Univ. of California, Berkeley.
NOTES IN OPERATIONS RESEARCH. 4.
Nov 64, 72p ORC-64-30
Contract Nonr22283; Grant NSF GP2633
Unclassified report

See also AD-434 782.

Descriptors: (*Operations research, Theory), Statistical processes, Mathematical programming, Management engineering, Decision theory, Optimization, Abstracting.

Contents: Statistical Inference in Markov-Renewal Processes; A Note on Deficit, Excess, and Spread in a Markov-Renewal Process; Near-Parallel Constrained

Objectives in Integer Programs; Programming Under Nonlinear Constraints by Unconstrained Minimization: A Primal-Dual Method; Le Méthode du Chemin Critique-Application aux Programmes de Production et d'Études de la Méthode P.E.R.T. et ses Variantes; Les Problems d'Ordonnencement-Application et Méthodes; Scientific Decision Making in Business: Readings in Operations Research for Nonmathematicians; Selected Thesis Abstracts in Operations Research.

AD-613 000 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
NONPARAMETRIC IMPLICATIONS OF RANDOM CONVERSION OF DISCONTINUOUS DATA TO NEARLY EQUIVALENT CONTINUOUS FORM.
Professional paper,
by John E. Walsh. 12 Mar 65, 21p
Rept. no. SP-463/000/01

Unclassified report

Descriptors: (*Statistical data, Processing), Stochastic processes, Population (Mathematics), Statistical tests.

This paper contains an extensive consideration of general approach for converting discontinuous data to almost equivalent continuous form outlined in previous works with respect to nonparametric uses. Both the theoretical and application aspects are discussed. In some cases, the property investigated is exactly preserved by the conversion. Several examples are given of such cases. Often, the change in the property being investigated (due to the conversion to continuous data) is unimportant. Even when the change is important, bounded probability results can sometimes be obtained by suitable conversion of the data to continuous form. An example is given that illustrates this kind of application. (Author)

AD-613 034 Div. 15, 28, 32
CFSTI Prices: HC$4.00 MF$0.75

Princeton Univ., N. J.
PLAYING AN n-PERSON GAME, AN EXPERIMENT.
Econometric Research Program,
by Michael Maschler. 1 Feb 65, 112p
Research memo no. RM-73
Contract Nonr185816

Unclassified report

Descriptors: (*Game theory, Experimental data), (*Group dynamics, Bargaining), (*Bargaining, Group dynamics), Behavior, Set theory, Social psychology, Social sciences.

The author attempted in this paper to provide explanations for the various outcomes of an experiment designed to study how coalitions are formed in human relations. Although the bargaining set alone did not suffice to explain the outcomes for many types of games, by incorporating other ideas with the bargaining set theory, it is felt a more or less satisfactory solution can reached. Thus, the present analysis contains several conjectures which can be tested by statistical methods. In addition, the outcomes exhibit interesting features which deserve further theoretical and experimental study. It seems that standards of fairness which may exist among various groups must needs be taken into account when a game is to be described by a characteristic function. Also, it becomes fairly clear that a normative analysis of playing a game should take into consideration changes in the characteristic function (and in the set of active players) which result from intermediate agreements. Thus one can see, on the one hand, that game theoretical tools may be used to describe human behavior and, on the other, that more topics will have to be evolved in game theory before a satisfactory approximation to real situations can be achieved.

AD-613 066 Div. 15

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
EXISTENCE, UNIQUENESS, AND STABILITY FOR NON-LINEAR DIFFERENTIAL-DIFFERENCE EQUATIONS IN THE NEUTRAL CASE.
Technical rept.,
by Wolfe Snow. Feb 65, 57p IMM-NYU-328
Contract Nonr28555, Proj. NR062 160

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Nonlinear differential equations, Difference equations), (*Difference equations, Nonlinear differential equations), Integral transforms, Transcendental functions, Transmission lines, Integrals.

For ordinary differential equations it is well known that an equilibrium solution is stable if the linearized equation has only exponentially decaying solutions. The differential-difference equation $u'(t+s) - u'(t) + au(t+s) = g(t, u(t), u(t+s))$, $a > 0$, $s > 0$, when linearized, also has decaying exponentials $\exp(st)$, but the characteristic roots s approach the imaginary axis. The problem arises -- do solutions of this equation decay. An affirmative answer is obtained for this problem, the rate of decay depending upon the smoothness of the initial data and nonlinear term and the rate of approach of the characteristic roots to the imaginary axis. Then this result is applied to a transmission line problem. Also, an example is given of a homogeneous linear ordinary differential-difference equation with constant coefficients, whose characteristic roots all lie in the left half plane, having an unbounded solution. (Author)

AD-613 067 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
ON SOME TESTS OF HOMOGENEITY OF VARIANCES.
Technical rept.,
by Madan L. Puri. Mar 65, 19p IMM-NYU-338
Contract Nonr28538, Proj. NR042 206

Unclassified report

Descriptors: (*Analysis of variance, Statistical tests), (*Statistical tests, Analysis of variance), Probability, Statistical distributions, Sampling, Distribution theory.

For testing the equality of c continuous probability distributions on the basis of c independent random samples, various non-parametric tests for dispersions are offered.

These tests, include among others, the multi-sample analogues of the two-sample normal-scores test of dispersion and the tests considered by Ansari and Bradley, Klotz, Mood, and Siegel and Tukey. Under suitable regularity conditions, it is shown that these tests have limiting non-central chi-square distributions with c-1 d.f. The asymptotic relative efficiencies (in the Pitman sense) of these tests relative to one another and the F test, are obtained and are shown to be the same as for the two-sample problem. (Author)

16. Medical Sciences

AD-612 450 Div. 16

Georgetown Clinical Research Inst., Washington, D. C.
ON THE ELIMINATION OF PULSE WAVE VELOCITY IN STROKE VOLUME DETERMINATION FROM THE ULTRALOW-FREQUENCY DISPLACEMENT BALLISTOCARDIOGRAM,
by A. G. W. van Brummelen, W. R. Scarborough, and W. K. T. Josenhans. 6 May 63, 6p
AM 65-8 Unclassified report

Pub. in American Heart Journal (U. S.) v67 n3 p374-78 Mar 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ballistocardiography, Anatomical models), Heart, Blood pressure, Blood volume, Aorta, Cardiovascular system, Hydrodynamics Linear systems, Extremely low frequency, Least squares method, Correlation techniques.

A hydrodynamic model of the systemic circulatory system was mounted on an ultralow-frequency ballistocardiograph (ULF-BCG). The relationship between stroke volume and ballistocardiographic amplitude was investigated for different pulse wave velocities. It was found that the amplitude of the displacement ballistocardiogram, as used by Kiensch ('J' M minus 'I' J), is strongly correlated to stroke volume; however, the relationship is highly dependent on pulse wave velocity. Closer evaluation of the data showed that there is a combination of amplitude measurements that also gives a strong correlation between amplitude and stroke volume but is now independent of pulse wave velocity. (Author)

AD-612 451 Div. 16

Georgetown Clinical Research Inst., Washington, D. C.
PUPILLARY MOVEMENTS DURING ACUTE AND CHRONIC FATIGUE. A NEW TEST FOR THE OBJECTIVE EVALUATION OF TIREDNESS,
by Otto Lowenstein, Richard Feinberg, and Irene E. Loewenfeld. 1963, 21p
AM 65-9 Unclassified report

Pub. in Investigative Ophthalmology (U. S.) v2 n2 p1-21 Apr 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fatigue (Physiology), Photosensitivity (Biological)), (*Photosensitivity (Biological), Fatigue (Physiology)), Eye, Pathology, Oscillation, Sleep, Stimulation, Drugs, Muscles, Relaxation (Physiology), Reflexes, Central nervous system, Emotions.

Spontaneous pupillary movements in darkness were recorded (1) in healthy subjects of different ages when they were rested or fatigued, (2) in chronically tired subjects without known neurological defects, and (3) in patients with various neurological lesions. In some of the experiments, local or systemic drugs were used. While the pupils are large and quiet in darkness when the subject is alert, they oscillate under the influence of tiredness. Waves of spontaneous pupillary contraction and dilation accompany periods of increasing sleepiness and spontaneous arousal until, at the moment immediately preceding sleep, the pupils become very small. The mechanism of these movements was analyzed and a simple test described which allows the objective determination of the degree of acute fatigue in a given subject at a given time. In the light of these results, the concepts of 'normal' and of 'pathologic' fatigue were discussed. (Author)

AD-612 453 Div. 16, 25

Naval Medical Research Lab., New London, Conn.
EFFECT OF FIELD SIZE AND POSITION ON MESOPIC SPECTRAL SENSITIVITY.
Rept. no. 35,
by Jo Ann S. Kinney. 9 Dec 63, 9p
Rept. no. 433, v23-n15
Proj. MR005 14 1001 1 35
Unclassified report

Pub. in Optical Society of America. Journal (U. S.) v54 n5 p671-7 May 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Photosensitivity (Biological), Color vision), (*Color vision, Photosensitivity (Biological)), Spectra (Visible and ultraviolet), Eye, Vision, Adaptation (Physiology), Retina, Light, Stimulation.

Spectral sensitivity curves were determined at mesopic luminance levels, 0.1 and 0.01 ft-L, for a 2 degree field viewed foveally and parafoveally. These data are compared with similar curves for a 10 degree field, centrally fixated, whose area encompasses the smaller areas studied individually. The results show that, at 0.1 ft-L, differences between the 2 degree and 10 degree fields are similar to those between the CIE 2 degree and 10 degree photopic curves; furthermore the large field data can be predicted from the 2 degree data. At 0.01 ft-L however the spectral sensitivity is different from both CIE photopic and scotopic values at all positions and summation within the large field is complex. (Author)

AD-612 454 Div. 16

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
EFFECT OF PITRESSIN INFUSION ON PLASMA FREE FATTY ACID LEVELS IN MAN.
Final Rept. for Aug-Dec 63,
by Jack K. Goldman. Oct 64, 7p
Rept. no. AMRL-TR-65-17
Proj. 7222
Unclassified report

Pub. in Society for Experimental Biology and Medicine. Proceeding (U. S.) v117 n1 p164-6 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pituitary hormones, Fatty acids), (*Fatty acids, Inhibition), Adrenocorticotropic hormones, Blood, Glucose, Hypotension, Dogs, Humans.

The infusion of 0.01 pressor units Pitressin per kilogram per hour produced a decrease in plasma FFA concentrations in healthy young men without changing blood glucose concentration. The effect was evident after 40 minutes of infusion and progressed to a value equal to 80% of baseline in one hour. These findings support the hypothesis that vasopressin may have contributed to the decreasing plasma concentrations of FFA of man noted concurrently with hypotension during a passive tilt after water immersion. (Author)

AD-612 455 Div. 16

Johns Hopkins Univ., Baltimore Md. School of Medicine.
THE GOITROGENIC ACTIVITY OF PEROXIDASE,
by James P. Isaacs, John C. Lamb, John A. Myers, and Felix I. Gottlieb. 1962, 1p
Contract AF49 638 580
AFOSR 3443 Unclassified report

Pub. in Johns Hopkins Hospital. Bulletin (U. S.) v110 p232 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Peroxidases, Thyroid gland), (*Thyroid gland, Peroxidases), Thyroid hormones, Thiourea, Inhibition, Pathology, Histological techniques, Rabbits.

Peroxidase was administered to rabbits in oral dosages of 1 to 2 milligrams per kilogram body weight per day. The peroxidase has been fed in form of cabbage, horse-radish root, water extract of horse-radish root, and lyophilized horse-radish peroxidase. Each of these has caused (a) follicular epithelial hyperplasia in the thyroid and (b) graded increases in thyroid weight with graded increases in dosage of peroxidase. It has been possible to measure spectrophotometrically a several fold increase in peroxidase activity in the thyroid glands of animals fed the above materials. Peroxidase levels in the blood of these animals is also increased. By way of control observations, 1-5 vinylthioxazolidone, n-propylthiouracil, etc. inhibit peroxidase activity in vivo and in vitro. The lyophilized peroxidase when heated to cause denaturation does not exert a giotrogenic effect. 1-5 vinylthioxazolidone is poorly soluble in water, yet the water extract of horse-radish containing peroxidase in dosages of 2 mg./Kg./day is very goitrogenic, producing a 50 per cent increase in thyroid weight in 14 days. Intravenous peroxidase in 1/100th the oral dosages (0.02 mg./Kg./day) causes goiters and increases thyroid peroxidase activity. For the present, the observation is advanced that oral exogenous peroxidase is goitrogenic. Additional studies are being pursued with the object of linking more definitively the intrathyroidal mechanism of goitrogenesis with the thyroid peroxidase system. (Author)

AD-612 525 Div. 16

Baylor Univ., Houston, Texas. Coll. of Medicine.
AMOUNT OF ALBUMIN AND ITS MIXING RATE IN THE DOG,
by R. A. Huggins, S. Deavers, and E. L. Smith.
25 May 64, 5p
Contract DA49 193MD2357; Grant PHS HE06983 02
Unclassified report

Pub. in American Journal of Physiology (U. S.) v208 n1 p182-5 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Serum albumin, Tracer studies), (*Blood plasma, Serum albumin), Body fluids, Lymph, Blood vessels, Mixtures, Distribution, Metabolism, Cannulation, Volume, Labeled substances, Statistical analysis, Dogs.

Data on rates of mixing of I(131)-tagged albumin between vascular and extra-vascular compartments indicate that albumin disappears from the plasma at three exponential rates. The first rapid rate changes to a slower rate at 8 hr and continues until mixing is complete between vascular-extravascular albumin, in approximately 3 days. The third rate is interpreted as the metabolism of albumin. The data suggest that the extravascular space has at least two compartments, one that exchanges albumin with plasma rapidly and the other slowly. At approximately 8 hr, equilibrium was reached between specific activity of plasma and lymph albumin; it was postulated that the rapidly mixing extravascular compartment may be associated with the large pore area of the liver. Total amount of albumin was 2.87 g/kg with a ratio of extra- to intravascular albumin of 1.22. The mean volume of distribution of albumin was 168.8 ml/kg (17% of body wt), with 50 ml/kg in the circulation, 15.3 ml/kg in the rapidly mixing, and 103.5 ml/kg in the slowly mixing compartments of extravascular spaces. (Author)

AD-612 533 Div. 16, 2

Scottish Marine Biological Association, Edinburgh.
OPHIOPLUTEUS DUBIUS FROM SCANDINAVIAN AND NORTH AMERICAN WATERS,
by Stephen R. Geiger. 1964, 2p Unclassified report
Contract N62558 2834
Pub. in Limnology and Oceanography (U. S.) v9 n2 p258-9 Apr 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Echinodermata, Larvae), Plankton, Atlantic Ocean, North Sea, Norway, North America, Seacoast, Scotland, Marine biology.

Tows were made by the Continuous Plankton Recorder (Discovery Rept. 11:457-510 (1936)) in 17 separate months during the period July 1961-June 1963 between St. John's, Newfoundland, Halifax, Nova Scotia, and Boston, Massachusetts. Included in the samples that were collected are the first records from North American waters of the ophiuroid larva Ophiopluteus dubius. The adult that spawned this larva is unknown. O. dubius has previously been found in Scandinavian waters, and there only infrequently. From along the route that crosses the St. Pierre Bank, Laurentian Channel, and Nova Scotian Shelf, 568 samples were collected during the period July 1961-June 1963 and analyzed. Three of these samples contained O. dubius. On present evidence, it is impossible to assign this larval species to an adult because a number of adult ophiuroids have a distribution that includes the coast of Norway, the Kattegat, and the east coast of North America and are rare or absent from parts of the North Sea shallower than 200 m.

AD-612 544 Div. 16, 30

California Univ., Los Angeles.
CONTINUOUS TURBIDIMETRIC ANALYSIS OF pH DEPENDENT BIOLOGICAL COALESCENCE PROCESSES,
by D. P. Ryan and A. Kolin. 18 May 64, 6p
Unclassified report

Pub. in I E E E Transactions on Bio-Medical Electronics (U. S.) vBME-11 n3 p109-13 Jul 1964 (Copies not available to DDC or Clearinghouse customers).
Research supported by the Office of Naval Research, Washington, D. C.

Descriptors: (*Viruses, Test methods), (*Bacteria, Test methods), (*Muscle proteins, Polymerization), (*Polymerization, Measurement), Colloids, Analysis, pH, Test equipment, Light transmission.

The method described allows rapid analysis, by pH modulation, of the coalescence of small samples of biological materials in dilute suspensions. Specifically, agglutination of various species of viruses and bacteria at their isoelectric points, and the polymerization process of the muscle protein actin are investigated. A typical time of analysis is 20 sec, and 5 ml of suspensions as dilute as 0.2 mg/ml are sufficient for most viruses investigated. (Author)

AD-612 545 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
ELECTRON MICROSCOPIC STUDIES OF THE VASCULAR PERMEABILITY AND THE MECHANISM OF DEMYELINATION IN EXPERIMENTAL ALLERGIC ENCEPHALOMYELITIS,
by P. Lampert and S. Carpenter. 1965, 14p
Unclassified report

Pub. in Journal of Neuropathology and Experimental Neurology (U. S.) v24 n1 p11-24 Jan 1965 (Copies not available to DDC or Clearinghouse customers)
Presented in part at the annual meeting of the American Association of Neuropathologists, 13 Jun 64, held at Atlantic City, N. J.

Descriptors: (*Brain, Diseases), (*Spinal cord, Diseases), (*Nerve fibers, Pathology), Electron microscopy, Allergy, Tracer studies, Permeability, Cells (Biology), Thorium compounds, Dioxides, Rats.

In early lesions of experimental allergic encephalomyelitis in rats Thorotrast passes through vessel walls concomitant with invading mononuclear cells. The particles are found between the endothelial cells, within the vacuolated basement membrane, and in the extracellular space between glial processes. In advanced lesions, markedly widened extracellular spaces often contain threads of fibrin along with Thorotrast. Demyelination occurs in the presence of mononuclear cells which invade the myelin sheath, peeling off individual myelin lamellae or the entire sheath. A separate alteration of myelin consists of a regular widening of the interlamellar space beginning with the outer layers. The possibility that this change precedes the cellular invasion of the myelin sheath is discussed. (Author)

AD-612 547 Div. 16

London Univ. (England).
CHANGES IN THE PATTERNS OF IN VITRO RESPIRATION OF KITTEN DIAPHRAGMS DURING THE FIRST FEW WEEKS AFTER BIRTH,
by Harold Baum, Hosny A. El-Khanagry, and Roland E. Moore. 24 Feb 64, 15p Unclassified report
Proj. NR102 588

Pub. in Canadian Journal of Physiology and Pharmacology v 42 p831-44 1964 (Copies available only to DDC users).

Descriptors: (*Diaphragms (Anatomy), Respiration), (*Respiration, Cats), Barbiturates, Anesthesia, Succinates, Reserpine, Levarterenol, Oxygen consumption, Body weight, Metabolism, Aging (Physiology).

The pattern of respiration in vitro of hemidiaphragms from cats aged 1 to 42 days was studied. The initial rate (i.e. Q 02 in the first 30 minutes) was higher after animals had been killed traumatically than under Nembutal. The initial rate after Nembutal was indistinguishable from the steady rate (i.e. Q02 during the period 30-60 minutes) for the group killed traumatically, and both of these rates were independent of animal size. However, the initial rate (traumatic killing) and the Q02 in the presence of added succinate (whatever the method of killing) both decreased with increasing animal weight. The Q02 value in succinate was indistinguishable from that in oleate and both were higher than the initial rate. The patterns of respiration observed are discussed in terms of O2 and substrate availability and of a possible carrying over of a metabolic stimulation from in vivo to in vitro after traumatic killing. (Author)

AD-612 548 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
SOME BIOCHEMICAL AND PHYSICAL PROPERTIES OF THE HUMAN PERMEABILITY GLOBULINS,
by L. J. Kagen. 2 Feb 64, 9p
Unclassified report

Pub. in British Journal of Experimental Pathology (Gt. Brit.) v45 n6 p 604-11 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Globulins, Chemical properties), Permeability, Inhibition, Carboxylic ester hydrolases, Trypsin, Blood serum, Blood plasma, Enzymes, Biological assay, Immunity.

The permeability activity of globulin A is inhibited by C prime 1 esterase inhibitor, soy bean trypsin inhibitor, and di-isopropylfluorophosphate. TAMe portects against this DFP inhibition, and preparations of A contain SBTI inhibitable TAMe esterase. Preparations of A are also SBTI inhibitable kininogenases which liberate a smooth muscle contracting factor from both heated (63C, 1 hr.) and unheated plasma. A is estimated to have a sedimentation coefficient of approximately 11 S. It is concluded that globulin A is serum kallikrein. The permeability activity of globulin B is inhibited by C prime 1 esterase inhibitor, SBTI and DFP. TAMe protects against this DFP inhibition, and preparations of B contain SBTI inhibitable TAMe esterase. Preparations of globulin B are ineffective as kinin releasers when heated plasma (63C, 1 hr.) is used as the substrate. B is estimated to have a sedimentation coefficient of approximately 6 S. It is concluded that B is PF/dil. The inhibition of both permeability globulins by C prime 1 esterase inhibitor indicates that this inhibitor may be the permeability globulin inhibitor lacking in the disease, hereditary angioneurotic oedema. (Author)

AD-612 549 Div. 16

Naval Medical Research Inst., Bethesda, Md.
NEMATODE PARASITES FROM MAMMALS TAKEN ON TAIWAN (FORMOSA) AND ITS OFFSHORE ISLANDS,
by Betty J. Myers and Robert E. Kuntz.
25 Feb 64, 7p Research rept. MR-005.09-1606.01-R-14
Unclassified report

Pub. in Canadian Journal of Zoology v42 p863-8 1964 (Copies available only to DDC users).
Research made in cooperation with MacDonald Coll., McGill Univ., Montreal (Quebec).

Descriptors: (*Nematodes, Taiwan), Parasites, Animals, Rodents, Skin, Worms, Collecting methods.

The nematodes identified from non-domesticated mammals taken on Taiwan and its offshore islands by the U. S. Naval Medical Research Unit No. 2 are listed under hosts. (Author)

AD-612 552 Div. 16

Oxford Univ. (England).
EXOTOXINS,
by W. E. van Heyningen and S. N. Arseculeratne.
1964, 22p
Unclassified report

Pub. in Annual Review of Microbiology (U. S.) v18 p195-216 1964(Copies available only to DDC users).

Descriptors: (*Toxins and antitoxins, Microbiology), Bacteria, Staphylococcus, Corynebacterium, Clostridium botulinum, Clostridium tetani, Dysentery, Diseases, Vaccines, Production, Chemical properties, Enzymes, Immunity, Pathology, Great Britain.

Contents:
Diptheria toxin
The physiology of diphtheria toxin production
The nature of diphtheria toxin
The mode of action of diphtheria toxin
Staphylococcal toxins
Staphylococcal alpha toxin
Staphylococcal leucocidin

Staphylococcal enterotoxin
Neurotoxins
Dysentery toxin
Botulinum toxin
Tetanus toxin

AD-612 553 Div. 16, 4

Texas Univ., Dallas. Southwestern Medical School.
SPECIFICITY OF A LIPASE OF THE INTESTINAL MUCOSA,
by Herbert C. Tidwell, J. Lon Pope, Roy E. Askins, and James C. McPherson. 1963, 6p

Unclassified report

Pub. in mono. Biochemical Problems of Lipids, Amsterdam, 1963 p217-22 (Copies available only to DDC users).

Descriptors: (*Hydrolases, Chemical properties), (*Lipids, Decomposition), Intestines, Mucus, Fatty acids, Hydrolysis, Reaction kinetics, Stereochemistry, Fats.

The lipolytic action on triolein, diolein, alpha-monoolein, or beta-monopalmitin emulsions by an enzyme present in a homogenate of rat intestinal mucosa was investigated. Gain or loss of monoglyceride content as a measure of hydrolysis was followed by two methods. The data obtained are in agreement with previous results obtained by following changes in fatty acid content of the enzymatic digests. Little if any di- and triglycerides appeared to be hydrolyzed. The two monoglycerides appeared to be split at similar rates. This enzymatic action of an intestinal lipase on monoglycerides may serve to supplement the digestive action of pancreatic lipase which splits triglycerides into monoglycerides. (Author)

AD-612 554 Div. 16

Wichita Univ., Kans.
PROMOTION OR RETARDATION OF THE GROWTH OF ADENINE AUXOTROPHS OF CANDIDA ALBICANS BY PURINES, PYRIMIDINES AND NUCLEOSIDES,
by A. Sarachek. 27 Apr 64, 18p
Proj. NR103 459

Unclassified report

Pub. in Antonie van Leewenhoek; Journal of Microbiology and Serology (Netherlands) v30 n3 p289-302 1964 (Copies available only to DDC users).

Descriptors: (*Candida, Growth substances), (*Antimetabolites, Candida), Adenine, Biosynthesis, Purines, Pyrimidines, Nucleosides, Guanine, Toxicity, Inhibition, Metabolism.

A study has been made of the growth responses to purine and pyrimidine metabolites shown by sixteen ultraviolet-induced adenine requiring mutants of Candida albicans blocked at early stages in purine biosynthesis. The salient findings establish that, in C. albicans, (1) the pathway for the conversion of adenine to guanine is not reversible, (2) exogenous nucleotides are not utilized, and the purine and pyrimidine components of exogenous nucleosides must be converted to the free base form before utilization and (3) cytosine and guanine competitively inhibit different steps in the utilization of exogenous adenine. (Author)

AD-612 563 Div. 16, 28

Oxford Univ. (England).
THE DEVELOPMENT OF PHOTOPIC AND SCOTOPIC VISION IN THE FROG (RANA TEMPORARIA),
by W. R. A. Muntz. 7 Nov 63, 12p
Contract N62558 2453

Unclassified report

Pub. in Vision Research (U. S.) v4 p241-50 1964 (Copies available only to DDC users).

Descriptors: (*Vision, Adaptation (Physiology)), (*Amphibians, Vision), Color vision, Retina, Photosensitivity (Biological), Intensity, Spectra (Visible and ultraviolet), Histological techniques, Great Britain.

The development of photopic and scotopic vision in the frog (Rana temporaria) was investigated, using the electroretinogram as an index of visual function. It was found that very young tadpoles always showed the spectral sensitivity typical of cone function, maximal at approximately 570 millimicrons, irrespective of their state of light-adaptation. As the tadpoles grew older the Purkinje shift developed progressively, only becoming complete after metamorphosis. This confirms the previous behavioural experiments of Birukow (1949). The results indicate that the lack of a Purkinje shift in young tadpoles is not due to the rods being non-functional, but is a consequence of the rods having a spectral sensitivity at this stage of development which is the same as that typically associated with cones. It is concluded that the rods develop through a cone-like stage, both in their histological appearance and in their spectral sensitivity. (Author)

AD-612 568 Div. 16, 28

Rome Univ. (Italy).
THE ROLE OF CEREBRAL CHOLINERGIC STRUCTURES IN LEARNING: RELATIONSHIP BETWEEN CONDITIONED RESPONSES AND THE EEG ARREST REACTION (Studi sul Ruolo Delle Strutture Colinergiche Cerebrali nel Condizionamento: Relazioni fra le Risposte Condizionate e la Reazione D'Arresto EEG),
by Gian Franco Ricci and Luisa Zamparo.
1963, 5p
Grant AF EOAR63 90
AFOSR 65-0307

Unclassified report

Pub. in Rivista di Neurologia (Italy) v34 n3 p283-6 1964 (Copies available only to DDC users).
Text in Italian.

Descriptors: (*Parasympatholytic agents, Conditioned reflex), (*Psychotropic agents, Parasympatholytic agents), Drugs, Learning, Behavior, Electroencephalography, Cholinesterase, Sympathomimetric agents, Scopolamine, Atropine, Indole alkaloids, Amphetamines, Monkeys, Italy.

Earlier work by the authors had shown that atropine, in doses sufficient to alter the resting EEG and arrest reaction, also altered classical conditioned responses (i.e., affected behavior). The current report deals with other anticholinergics, a cholinesterase, and a sympathomimetic. Scopolamine and benactyzine exerted effects similar to atropine. Eserine, when administered by itself, altered both the EEG and conditioned responses; but, when administered to monkeys pretreated with an anticholinergic, it caused the EEG to return to normal and restored conditioned reifexes. Amphetamine given to monkeys pretreated with an anticholinergic did not alter the anticholinergic EEG pattern, but did restore the conditioned response. The authors propose a possible explanation for the differing effects between the cholinergic and sympathomimetic drugs. (Author)

AD-612 569 Div. 16, 28

Rome Univ. (Italy).
EFFECTS OF ATROPINE ON THE EEG AND CONDITIONING IN THE MONKEY (Effetti Dell' Atropina Sull'eeg e Sul Condizionamento Della Scimmia),
by G. F. Ricci and L. Zamparo. 1963, 4p
Grant AF EOAR63 90
AFOSR 65-0306

Unclassified report

Pub. in Archivio Italiano di Scienze Farmacologiche v13 (ser3) n3 1963 (Copies available only to DDC users) Text in Italian.

Descriptors: (*Atropine, Psychotropic agents), (*Psychotropic agents, Atropine), Electroencephalography, Conditioned reflex, Behavior, Parasympatholytic agents, Attention, Learning, Monkeys, Italy.

Previous workers who had studied the effects of atropine on animal behavior had claimed that the classical EEG picture produced by the drug (slowing of cortical activity and disappearance of the arrest reaction to external stimuli) was not accompanied by behavioral changes. The authors employed classical conditioning techniques to refine behavioral measurements. They concluded that atropine (and probably anticholinergic drugs in general) can exert a measurable effect on attention and the learning process. (Author)

AD-612 578 Div. 16

Illinois Univ., Urbana.
INDUCTION AND PROPERTIES OF A TEMPERATE BACTERIOPHAGE FROM BACILLUS STEAROTHERMOPHILUS,
by N. E. Welker and L. Leon Campbell.
27 Jun 64, 11p
Grant NSF GB4, Proj. NR108 330

Unclassified report

Pub. in Journal of Bacteriology (U. S.) v89 n1 p175-84 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bacteriophages, Physical properties), Bacteria, Culture media, Temperature, Morphology (Biology), Molecular weight, Desoxyribonucleic acids, Guanine, Immunity.

Bacillus stearothermophilus 1503-4R growing at 55 C was induced to lyse either when 0.05 micrograms/ml of mitomycin C was added or when it was exposed to ultraviolet light for 30 sec. Lysis of the induced cultures occurred 45 to 60 min after induction. Phage were assayed on B. stearothermophilus 4S giving turbid plaques 0.05 to 0.03 cm in diameter. Noninduced cultures of 1503-4R spontaneously produced one phage per 2.8 x 10 to the 6th power bacterial cells. The optimal temper-a ature for phage production and assay was found to be 55 C. B. stearothermophilus 1503-4R was immune to the isolated temperate phage (TP-1) and to a clear-plaque mutant phage (TP-1C), even when tested at phage mutliplicities of 100. TP-1 and TP-1C phage were identical morphologically having a head 65 millimicrons in diameter and a tail 240 millimicrons long and 12 millimicrons wide. TP-1C phage deoxyribonucleic acid (DNA) had an S sub 20, w value of 24.1 and a calculated molecular weight of 1.2 x 10 to the 7th power. DNA base compositions of TP-1 and TP-1C phage were identical (42% guanine + cytosine), but differed significantly from those of the lysogenic or indicator strains of B. stearothermophilus (50% guanine + cytosine). No unusual bases were detected in either the bacterial or phage DNA. (Author)

AD-612 582 Div. 16

California Univ., San Francisco. Medical Center.
ANTIGENICITY OF HEREDITARY HUMAN GAMMA GLOBULIN (Gm) FACTORS, BIOLOGICAL AND BIOCHEMICAL ASPECTS,
by H. H. Fudenberg, E. R. Stiehm, E. C. Franklin, M. Meltzer, and B. Frangione. 1964, 10p
Contract Nonr365612; Grant PHS H5997, Proj. NR105 308

Unclassified report

Pub. in Cold Spring Harbor Symposia on Quantitative Biology v29 p463-72 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gamma globulin, Genetics), (*Antigens and antibodies, Gamma globulin), Antigen-antibody reactions, Immunity, Pregnancy, Infants, Peptides, Proteins, Amino acids, Stimulation, Inhibition, Symposia.

Peptide mapping has demonstrated that gamma globulins of different Gm types differ in primary structure. A single peptide present in Gm(a +) H chains and F fragments is lacking in the corresponding Gm (-) structural subunits; similarly, the presence of a single peptide distinguishes Gm(b+) from Gm(b-) proteins. These differences, distinguishable serologically, may reflect a substitution of a single amino acid due to the change of a single base pair. The single peptide differences observed may be responsible for the antigenicity (serologic reactivity) of Gm (+) proteins in standard test systems, and for the immunogenicity of Gm (+) proteins in Gm (-) individuals; such immunogenicity has been documented; anti-Gm factors may be induced by deliberate immunization of Gm(-) individuals and by fetal-maternal Gm incompatibility. In vivo Gm-anti-Gm interaction may produce significant clinical effects. (Author)

AD-612 589 Div. 16

California Univ., Los Angeles. School of Medicine.
STIMULATION OF CORTICOSTEROIDOGENESIS IN ADRENAL HOMOGENATES BY SERUM PROTEIN,
by Rhoda Makoff, Sidney Roberts, and Diane D. Fowler. 28 May 64, 9p
Grant PHS GM03869, Proj. NR110 402

Unclassified report

Pub. in Journal of Biological Chemistry (U. S.) v239 n12 p4124-31 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Corticosteroid agents, Biosynthesis), (*Adrenal cortex hormones, Stimulation), Secretion, Blood proteins, Globulins, Steroids, Progesterone, Organic phosphorus compounds, Adenosine phosphates, Electrophoresis, Immunity, Rats.

Homogenates of rat adrenal tissue, incubated in the presence of 3.5 mM glucose 6-phosphate, 1 mM nicotinamide adenine dinucleotide phosphate, and approximately 0.06 mM progesterone-4(14)C, produced three major radioactive, ultraviolet-absorbing steroids which were identified as corticosterone, 11-deoxycorticosterone, and 11beta-hydroxyprogesterone. Doubling the concentration of reduced nicotinamide adenine dinucleotide phosphate-generating system enhanced the conversion of progesterone to 11beta-hydroxyprogesterone at the expense of corticosterone formation. Addition of small amounts of whole rat serum (less than 0.05 ml per 30 mg of adrenal) or plasma to the incubation medium at either concentration of reduced nicotinamide adenine dinucleotide phosphate-

generating system markedly stimulated the conversion of progesterone to 11-deoxycorticosterone and corticosterone. ACTH, epinephrine, serotonin, Pitressin, histamine, ascorbate, and glutathione, at levels well in excess of those occurring in the circulation, were all ineffective in this system. On the other hand, cyclic 3 prime, 5 prime-adenosine phosphate strikingly stimulated the conversion of progesterone to corticosterone in rat adrenal homogenates.

AD-612 636 Div. 16, 28
CFSTI Prices: HC$2.00 MF$0.50

School of Aerospace Medicine, Brooks AFB, Tex.
LECTURES IN AEROSPACE MEDICINE.
EXPERIMENTAL APPROACH TO THE PSYCHOPHYSIOLOGICAL PROBLEM OF MANNED SPACE FLIGHT,
by Bryce O. Hartman. 1960, 44p
Unclassified report

Descriptors: (*Space flight, Manned), (*Space medicine, Psychophysiology), (*Astronauts, Psychophysiology), Space environmental conditions, Closed ecological systems, Life support, Confined environments, Sensory deprivation, Performance (Human), Psychomotor tests, Tolerances (Physiology), Fatigue (Physiology), Weightlessness, Spacecraft cabins, Simulation, Diurnal variations, Display systems.

The psychophysiological problems of manned space flight are discussed. The three major areas of research included in the discussion involve the weightlessness problem, the Space Cabin Simulator program, and the analysis of dynamic behavior in the space cabin environment.

AD-612 660 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
A.T.D. PRESS. SPACE PHYSIOLOGY.
Special issue, vol. 3, no. 183.
23 Mar 65, 17p
Unclassified report

Descriptors: (*Space medicine, Physiology), (*Space biology, Radiation effects), (*Physiology, Space biology), Abstracting, Vibration, Acceleration, Central nervous system, Rabbits, Blood circulation, Vestibular apparatus, Gamma rays, Guinea pigs, Oxidation, Bone marrow, USSR.

Contents: effects of radiation, acceleration, and vibration on the central nervous system; effects of radial accelerations on the venous blood flow in the vessels of rabbit brains; effects of prolonged accelerations on the growth of the organism and the functional condition of certain systems; effect of whole-body vertical vibration on the functional condition of the vestibular organ of guinea pigs; effects of acute whole-body irradiation by gamma rays on the functional condition of the vestibular organ of guinea pigs; combined effects of vibration and acute irradiation on the functional condition of the vestibular organ of guinea pigs; the problem of the effect of whole-body gamma irradiation on the excitability of the spinal reflex arc; effect of whole-body vertical vibration on the functional state of the spinal reflex arc; the combined effects of vibration and of ionizing radiation on the functional condition of the spinal reflex arc; the effects of repeated vibration on the oxygen tension in the brains of rats; the combined effects of whole-body vertical vibration and irradiation on the oxidative processes in the brains of rats; effects of whole-body vertical vibration and X-rays on the nuclei of bone-marrow cells of mammals; Soviet bioastronautics papers to be presented in Paris in June 1965.

AD-612 740 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Navy Experimental Diving Unit, U. S. Naval Station, Washington, D. C.
DECOMPRESSION SICKNESS AMONG U. S. NAVY OPERATIONAL DIVERS: AN ESTIMATE OF INCIDENCE USING AIR DECOMPRESSION TABLES,
by R. E. Doll. 15 Feb 65, 20p
Research rept. RR-4-64
Proj. SF011 06 01, Task 3361
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Decompression sickness, Naval personnel), Diving, Helium, Casualties, Statistical analysis, Tables.

A 'liberal' estimate of the incidence of decompression sickness in U. S. Navy operational diving was computed for years 1958, 1960, and 1961. A comparison was made between the incidence using the old U. S. Navy air decompression tables (1958) and the revised U. S. Navy air decompression tables (1960, 1961). Incidences were also computed for dives equal to or greater than 100 feet and less than 100 feet. Findings revealed that for the three years a total of 7625 dives were made resulting in 62 reported cases of decompression sickness for an incidence of 0.81 percent. Incidence for the old tables was 1.10 percent versus 0.69 percent for the revised tables. Comparatively few dives of less than 100 feet required decompression, however, a somewhat higher incidence was found for these dives using the revised tables. The author gives a possible explanation for this apparent paradox. As a by-product of this study an incidence of 0.83 percent was noted when the U. S. Navy helium decompression tables were required. (Author)

AD-612 746 Div. 16, 28

Manitoba Univ., Winnipeg.
CUTANEOUS SENSITIVITY OF UNILATERAL ARM AMPUTEES,
by M. Aftanas and J. P. Zubek. 22 Oct 63, 5p
Proj. 9425 08
Unclassified report

Pub. in Canadian Journal of Psychology v18 n2 p101-5 1964 (Copies available only to DDC users).

Descriptors: (*Amputees, Sensory perception), Amputation stumps, Arms, Skin, Touch, Heat tolerance, Pain, Thresholds (Physiology), Canada.

Measures of tactual acuity and heat and pain sensitivity were obtained from 20 subjects with unilateral arm amputations. The measures were taken 3 in. above the stump and on a homologous area of the intact arm. Corresponding areas were tested in 20 matched controls. The tactual acuity of the stump was significantly greater than that of the intact limb or of either limb of the controls. For heat and pain sensitivity there was no significant difference between the stump and the intact arm. However, both arms of the amputees were significantly less sensitive to heat and pain than either arm of the controls. The results are related to current theories of cutaneous sensitivity. (Author)

AD-612 752 Div. 16, 4

Iowa State Univ., Iowa City.

THE MAJOR ALKALINE PROTEINASE OF ASPERGILLUS ORYZAE, ASPERGILLOPERTIDASE B. II. PARTIAL SPECIFIC VOLUME, MOLECULAR WEIGHT, AND AMINO ACID COMPOSITION.
Doctoral thesis,
by A. R. Subramanian and George Kalnitsky. 27 Jul 64, 8p
Contract Nonr406900; Grant NIH GM0671 5
Unclassified report

Pub. in Biochemistry (U. S.) v3 n12 p1868-74 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Molds (Organisms), Peptide hydrolases), (*Peptide hydrolases, Molecular properties), (*Amino acids, Chemical analysis), Nitrogen, Volume, Molecular weight, Moisture.

The nitrogen content, amino acid composition, partial volume, and molecular weight of aspergillopeptidase B, the major alkaline proteinase of Aspergillus oryzae, was determined using an apparently homogeneous enzyme preparation. The nitrogen content is 16.5%. Interesting features of the amino acid composition are the preponderance of glycine, alanine, and serine, and the complete absence of sulfur-containing amino acids. The partial specific volume of the enzyme, determined from density measurements of a series of solutions of concentrations between 2.7 and 0.5%, is 0.682 ml/g. The molecular weight, determined by the approach-to-equilibrium method using enzyme solutions of 0.5 and 1% concentration, gives an average value of 18,000. From the molecular weight and the amino acid content, the following amino acid composition was calculated for the enzyme: Asp21 Glu12 Gly19Ala23 Val15 Leu9 Ileu9-10 Ser19 Thr11 Pro4 Phe5 Tyr5 Try2 His4 Lys11-12 Arg2 (--CONH2)15. There are 171-173 amino acid residues per molecule of enzyme, and the molecular weight calculated from the amino acid composition lies between 17,561 and 17,802. (Author)

AD-612 821 Div. 16

Army Medical Research Lab., Fort Knox, Ky.
A CRITICAL REVIEW OF SOME NEW METHODS IN ANIMAL ANALGESIOMETRY,
by Wayne O. Evans. 24 Dec 64, 14p
Rept. no. AMRL-616
Proj. 3A012501A803, Tasks 01, 04
Unclassified report

Pub. in Journal of New Drugs (U. S.) v4 n4 p179-87 Jul-Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Analgesics and antipyretics, Animals), Pharmacology, Laboratory animals, Drugs, Dosage, Reflexes, Pain, Central nervous system, Heat.

A methodological analysis is presented of techniques developed since 1950 to test analgesic drugs in animals. Attention is drawn to type of nociceptive stimulus, complexity of response, classes of drugs tested, and comparative dose-response relations. It is concluded that the new techniques use more complex reactions to indicate pain than previous methods and that heat is less often used as the nociceptive stimulus.

AD-612 833 Div. 16

Johns Hopkins Univ., Baltimore, Md. School of Medicine.
TRANSPORT AND DIGESTION OF HEMOGLOBIN IN THE PROXIMAL TUBULE. II. ELECTRON MICROSCOPY,
by Jan L. E. Ericsson. 24 Sep 64, 25p
Contract DA49 193MD2379 Unclassified report

Pub. in Laboratory Investigation (U. S.) v14 n1 p16-39 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hemoglobin, Absorption (Biological)), (*Absorption (Biological), Hemoglobin), (*Kidneys, Absorption (Biological)), Histological techniques, Electron microscopy, Cells (Biology), Cell structure, Cytoplasm, Membranes (Biology), Morphology (Biology), Enzymes, Peptide hydrolases, Rats.

In the present study the ultrastructural alterations occurring in the proximal tubular cells of rat kidney during absorption and digestion of homologous, lyophilized hemoglobin are described. Hemoglobin was identified in the sections by comparison with the appearance and distribution of intracellular hemoglobin absorption droplets as revealed in a previous light microscopic and histochemical investigation. By electron microscopy hemoglobin appeared as an amorphous or, at higher magnifications, finely granular material of variable electron density, both in tubular lumens and in intracellular droplets. The evidence derived from the investigation indicated that hemoglobin was absorbed by way of pinocytosis from the tubular lumen and that the absorption droplets served to transfer hemoglobin to the cytosomes where it was digested. It would thus appear that the cytosomes, in addition to acid phosphatase, contain proteolytic enzymes capable of catalyzing the hydrolysis of hemoglobin. The findings were discussed with special reference to the mode of formation of hemoglobin absorption droplets in the apical cytoplasm and the morphologic interpretation and implications of the lysosome concept. (Author)

AD-612 834 Div. 16

Johns Hopkins Univ., Baltimore, Md. School of Medicine.
TRANSPORT AND DIGESTION OF HEMOGLOBIN IN THE PROXIMAL TUBULE. I. LIGHT MICROSCOPY AND CYTOCHEMISTRY OF ACID PHOSPHATASE,
by Jan L. E. Ericsson. 24 Sep 64, 15p
Contract DA49 193MD2379
Unclassified report

Pub. in Laboratory Investigation (U. S.) v14 n1 p1-15 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hemoglobin, Absorption (Biological)), (*Absorption (Biological), Hemoglobin), (*Kidneys, Absorption (Biological)), Cells (Biology), Cell structure, Morphology (Biology), Histological techniques, Microscopy, Phosphoric monoester hydrolases, Proteins, Biosynthesis, Degradation, Enzymes, Rats.

With the aim of studying structural and functional aspects of the absorption, transport, and degradation of protein in the proximal tubular cell, homologous hemoglobin was administered intravenously to rats, and the cellular alterations were studied with the light microscope. The cytochemical localization of acid phosphatase during the various stages of absorption and degradation of hemoglobin was investigated, and methods for the precise and reproducible demonstration of absorbed hemoglobin in paraffin sections of formaldehyde-fixed tissues, as well as tissues fixed in osmium tetroxide and embedded in Epon, were described. Hemoglobin absorption droplets and sites of acid phosphatase activity were demonstrated in the same section by incubating frozen sections of formaldehyde-fixed tissues first in a benzidine solution for the visualization of hemoglobin and subsequently in a medium for the demonstration of acid

phosphatase. Findings are discussed in view of recent biochemical, cytochemical, and ultrastructural data bearing on the relationships between endocytosis vacuoles and sites of acid phosphatase activity.

AD-612 840 Div. 16

Rochester Univ., N. Y. School of Medicine and Dentistry.
INERT GAS NARCOSIS,
by Wallace O. Fenn. 1965, 10p
Contract Nonr66811

Unclassified report

Pub. in New York Academy of Sciences. Annals (U. S.) v117 sec3 p760-7 Jan 21 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nitrogen, Anesthesia), (*Helium group gases, Anesthesia), Oxygen, Argon, Barometric pressure, Drosophila, Toxicity, Molecular properties, Heat production (Biology), Lipids, Solubility.

From a brief and incomplete review of the literature, it is concluded that narcosis by inert gases is a well-established phenomenon which has been demonstrated in a wide variety of living forms. The exact mechanism of the narcotic effect is unknown, although it is to be expected from correlations with lipoid solubility, thermodynamic activity, and molecular refraction. New experiments with fruit flies are reported which show a marked synergism between oxygen and the inert gases nitrogen and argon. These experiments suggest that nitrogen narcosis, expected under hyperbaric conditions, might be diminished in severity by keeping the oxygen tension at its normal atmospheric value. (Author)

AD-612 841 Div. 16

South Dakota State Coll., Brookings.
MAGNESIUM REQUIREMENT OF AEROBACTER AEROGENES FOR ASSIMILATION OF MOLECULAR AND COMBINED NITROGEN,
by D. C. Yoch and R. M. Pengra. 2 May 64, 2p
Contract Nonr308900

Unclassified report

Pub. in Journal of Bacteriology (U.S.) v88 n3 p808-9 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aerobacter aerogenes, Metabolism), Magnesium, Nitrogen compounds, Growth.

It was shown that the magnesium requirement for the anaerobic nitrogen fixer, A. aerogenes, was nearly the same, whether the organism was assimilating ammoniacal, nitrate, or glutamic acid nitrogen. When the organism was fixing molecular nitrogen, the experiments showed a need of 1.5 micrograms of magnesium per ml, as opposed to 1.0 micrograms for the other nitrogen sources. This difference could be due to experimental error or it could mean, as it suggests, a higher requirement for magnesium when fixing molecular nitrogen. The investigators suggest that the organism's requirement for magnesium is independent of nitrogen sources supplied, and that the need for magnesium is in another area of the organism's metabolism.

AD-612 843 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
X-RAY DIFFRACTION AND OTHER STUDIES OF THE CALCAREOUS DEPOSITS IN HUMAN PINEAL GLANDS,
by Kenneth M. Earle. 1964, 12p

Unclassified report

Pub. in Journal of Neuropathology and Experimental Neurology v24 n1 p108-18 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Calcification, Glands), (*X-ray diffraction analysis, Calcification), Cerebral cortex, Pathology, Histological techniques, X-ray spectroscopy, Crystals, Optical properties, Calcium, Phosphorus.

The calcareous deposits in human pineal glands, when examined after NaOH extraction or by drying the whole gland in air, reveal the x-ray diffraction powder pattern of a poorly resolved apatite. After wet or dry ashing of the gland a much better resolved pattern is obtained, which matches very closely the reported pattern of hydroxyapatite, Ca10(PO4)6(OH)2 or Ca5(PO4)3OH. The close resemblance of the pattern of these crystals to that of bone and teeth is discussed. X-ray fluorescent spectroscopy, histochemical, and wet chemical methods confirm the presence of calcium and phosphorus in these crystals. Opaque images of the edges of fragments of the ground crystals showed very small needle-like crystals in aggregates. Optical microscopy showed no well-formed crystal faces, and no well-formed single crystals could be identified. The identification of these crystals as a form of calcium phosphate of the hydroxyapatite pattern is inescapable. The evolution of gas upon treatment with acid indicated that some of the crystals contained carbonate apatite (Ca10(PO4, CO3, OH)6(OH)2). The histologic appearance and some of the optical properties of these crystals are discussed. Over 100 human pineal glands were used in various phases of the study. (Author)

AD-612 854 Div. 16

Goteborg Univ. (Sweden).
EXPERIMENTALLY INDUCED CHANGES IN THE BASE COMPOSITION OF THE RIBONUCLEIC ACIDS OF ISOLATED NERVE CELLS AND THEIR OLIGODENDROGLIAL CELLS,
by Endre Egyhazi and Holger Hyden. 29 Dec 60, 9p
Contract AF61 052 248
AFOSR 2119

Unclassified report

Pub. in Journal of Biophysical and Biochemical Cytology (U.S.) v10 n3 p403-10 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nerve cells, Cytochemistry), (*Cytochemistry, Ribonucleic acids), (*Ribonucleic acids, Chemical properties), Bases (Chemistry), Purines, Pyrimidines, Nitriles, Amines, Alkenes, Electrophoresis, Proteins, Guanine.

The effect of tricyano-amino-propene, a dimer of malononitrile, on the base composition of the RNA in isolated Deiters' nerve cells and their oligodendroglial cells was studied using a microelectrophoretic method. Tri-a-p in a dose of 20 mg/kg has the effect of increasing the RNA and protein content per nerve cell by 25 per cent and decreasing the glia RNA by 45 per cent. The RNA base composition of the nerve cells from the control animals differs from that of their glial cells. The guanine of the nerve cell is significantly higher than that of the glia, but the content of cytosine is higher in the glia than in the RNA of nerve cell. The cytosine of nerve cells decreased significantly after tri-a-p administration. In the glial cells the cytosine showed a

20 per cent increase, and the guanine a 25 per cent decrease. Tri-a-p sharpened the difference in RNA composition already existing between the control nerve cells and their glial cells by almost 300 per cent for the guanine and by 400 per cent for the cytosine. The chemical and functional relationship between the nerve cell and its oligodendroglial cells is discussed. (Author)

AD-612 869 Div. 16

Scottish Marine Biological Association, Edinburgh.
OPHIOPLUTEUS RAMOSUS BETWEEN ICELAND AND NEWFOUNDLAND,
by S. R. Geiger. 1963, 3p
Contract N62558 2834

Unclassified report

Pub. in Nature (Gt. Brit.) v198 n4883 p908-9 Jun 1 1963 (Copies available only to DDC users).

Descriptors: (*Plankton, Atlantic Ocean), Marine biology, Larvae, Adults, Iceland, Newfoundland (Province), Gulf stream, Great Britain.

Since the initiation in September 1959 of sampling by the Continuous Plankton Recorder between Iceland and Newfoundland, information has been gained on the periodic appearance of warm-water species in the plankton of this area. The occurrence of the ophiuroid larva Ophiopluteus ramosus along this route suggests some interesting aspects of the biology of this larva of which the adult is unknown. O. ramosus has previously been reported from south of Iceland and the vicinity of Flemish Cap in the spring and summer.

AD-612 870 Div. 16

Genoa Univ. (Italy).
ELECTROPHYSIOLOGICAL RESEARCH ON SLEEP IN THE DOG AND RABBIT (Ricerche Elettrofisiologiche sul Sonno del Cane e del Coniglo),
by F. Bonamini, V. de Carolis, P. Pastorino, and G. F. Rossi. 6 Dec 62, 21p
Contract AF61 052 461
AFOSR J703

Unclassified report

Pub. in Rivista de Neurobiologia (Italy) v8 n4 p394-413 Oct-Dec 62 (Copies available only to DDC users). Text in Italian.

Descriptors: (*Sleep, Animals), (*Electroencephalography, Sleep), Dogs, Rabbits, Blood pressure, Behavior, Thresholds (Physiology), Muscles, Italy.

The sleep of the normal dog and rabbit has been studied. The electrical neocortical rhythms, the electrical activity of the posterior cervical muscles, the blood pressure level and the behavior of the animals during sleep have been analyzed and related to the threshold of arousal by electrical subcutaneous stimulation. Two phases of sleep of different depth, quite similar to those previously observed in the cat, have been found in the dog: a light sleep phase characterized by synchronized EEG rhythms, moderate EMG activity and normal blood pressure level; a deep sleep phase, characterized by desynchronized EEG, flattening of the EMG, very low blood pressure level and twitching of the facial muscles. This subdivision of sleep in two phases is not possible in the rabbit. The most reliable index of the occurrence and depth of sleep in this animal has been identified with the occurrence of EEG synchronization. The sleep of the rabbit does not appear to reach the depth of that of the dog or cat. The partial disagreement between the present findings and those obtained in other laboratories is pointed out and discussed. Two possible explanatory hypotheses are advanced. (Author)

AD-612 908 Div. 16, 30
CFSTI Prices: HC$2.00 MF$0.50

Sensory Systems Lab., Tucson, Ariz.
NERVE CODING STUDIES. PHASE II. INSTRUMENTATION.
Final rept.,
by E. J. Baldes. 1 Jan 65, 28p
Contract DA49 092AR028

Unclassified report

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Descriptors: (*Telemeter systems, Biophysics), (*Biophysics, Telemeter systems), (*Monitors, Physiology), (*Physiology, Monitors), Animals, Ecology, Electronic equipment, Acoustic equipment, Solid state physics.

This report describes several solid state systems for observing physiological variables in untethered animals and for monitoring environmental factors, such as pressure, by units attached to the body of diving mammals. Brief descriptions of experimental applications are given. Each of the circuits and its application in a biological investigation was exploratory and is intended to develop the experimental techniques of biotelemetry. These developments are preliminary to research dealing with sensory abilities in animals in their natural environment. (Author)

AD-612 957 Div. 16, 1, 12
CFSTI Prices: HC$1.00 MF$0.50

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
A RESTRAINT SYSTEM FOR APPLICATION IN RsubZ AND -GsubX ACCELERATION ENVIRONMENTS WITH EMPHASIS UPON KNEE AND LOWER LEG RESTRAINTS.
Final rept. for Dec 63-Feb 64,
by Robert E. Van Patten. Dec 64, 15p
AMRL-TR-64-144
Proj. 7222

Unclassified report

Descriptors: (*Acceleration tolerance, Safety harness), (*Safety harness, Acceleration tolerance), Astronauts, Safety devices, Gravity (Artificial), Leg, Head, Body, Yaw, Design, Human engineering.

This report describes the development of a lower leg restraint system design suitable for use in yaw (R sub z) and transverse P-A G (-G sub x) acceleration environments. The design is based upon the principle of avoiding restraining force concentrations along the anterior crest of the tibia and has been worn with comfort for periods of up to three minutes with the legs in a 9.8 G field. (Author)

AD-612 980 Div. 16

Columbia Univ., New York. Coll. of Physicians and Surgeons.
HYDROXYUREA: A SPECIFIC INHIBITOR OF DEOXYRIBONUCLEIC ACID SYNTHESIS.
Preliminary notes,
by Herbert S. Rosenkranz and Jay A. Levy. 13 Nov 64, 4p
Contract Nonr26689; Grant PHS AI05111,
Proj. NR103 574

Unclassified report

Pub. in Biochimica et Biophysica Acta (Netherlands) v96 p181-3 1965(Copies available only to DDC users).

Descriptors: (*Desoxyribonucleic acid, Antimetabolites), (*Ureides, Desoxyribonucleic acid), Biosynthesis, Poisoning, Hydroxides, Netherlands.

The report is concerned with the effects of hydroxyurea on Escherichia coli C600, a substrain of E. coli K12. The effectiveness of hydroxyurea on various macromolecular syntheses and process was measured by determining the concentration of hydroxyurea required to limit increases of these functions by 50% when compared to untreated control cultures. The data illustrated in Fig. I indicate that hydroxyurea has a bacteriostatic rather than a bactericidal effect. A concentration of 0.032 M hydroxyurea was sufficient to cause 50% reduction in the increase in number of viable bacteria. On the other hand, the increase in turbidity of the culture, which is an index of protein production, required more than 0.2 M hydroxyurea for similar inhibition. This difference in the amounts of hydroxyurea required for equal inhibition of growth and turbidity is clearly indicative of unbalanced growth. This is borne out by the data in Table I which show that the concentration of hydroxyurea required to inhibit DNA synthesis and DNA metabolism by 50% is identical to the concentration of hydroxyurea that is needed to cause a 50% reduction in bacterial multiplication. The inhibition of other processes required much higher levels of hydroxyurea.

AD-612 981 Div. 16, 28

Pisa Univ. (Italy).
THE MIDPONTINE PRETRIGEMINAL CAT,
by Giuseppe Moruzzi. 27 Jan 62, 8p
Contracts AF61 052 107, AF61 514 1125
AFOSR J194

Unclassified report

Pub. in Archives Internationales de Pharmacodynamie et de Therapie (Belgium) v140 n1/2 p227-30 1962 (Copies available only to DDC users).

Descriptors: (*Brain, Surgery), (*Electroencephalography, Surgery), (*Reflexes, Brain), (*Conditioned reflexes, Brain), Laboratory animals, Cats, Behavior, Sleep, Histology, Neurology, Italy.

Some of the results obtained at the Institute of Physiology of the University of Pisa on the midpontine pretrigeminal preparation are reviewed. Particular attention is given to recent experiments showing that both orienting reflex and conditioning may be present in cats so prepared.

AD-612 986 Div. 16

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
RADIATION-INDUCED INCREASE IN LIFE EXPECTANCY IN A STRAIN OF YEAST,
by A. P. James and M. M. MacNutt. 6 May 64, 10p AECL-2122

Unclassified report

Pub. in Radiation Botany (U. S.) v4 p469-78 1964 (Copies available only to DDC users).

Descriptors: (*Radiation effects, Yeasts), (*Saccharomyces, Ultraviolet radiation), Life span, Culture media, Carbohydrates, Mutations, Mitosis, Inhibition, Temperature, Thiols, Canada.

The anomalous reaction of a respiratory-deficient strain of Saccharomyces cerevisiae to u.v. irradiation was investigated. Individual lines of this strain became moribund after reproducing for a variable number of cell generations on a medium normally considered optimal. The progression toward extinction could be halted by exposure of cells to u.v. light. Six influences were found which mimicked the effect of irradiation. These were: (1) a reduction of nutrients in the culture medium, (2) mutation, (3) substitution of galactose for dextrose in the culture medium, (4) an increased temperature of incubation, (5) a decreased temperature of incubation, and (6) a spindle poison, mercaptoethanol. In each case the increase in life expectancy of the strain was accompanied by a reduced rate of cell division. By analogy, the beneficial effect of irradiation was attributed to the inhibition of mitosis. It was considered that this inhibition permitted the accumulation of an essential substance which would otherwise be depleted and lead to cell death. The nature of this substance remains to be determined, but results indicated that its production is relatively unaffected by irradiation. (Author)

AD-612 987 Div. 16

Atomic Energy of Canada, Ltd., Chalk River (Ontario),
MUTANTS OF THE PARASITIC WASP DAHLBOMINUS FUSCIPENNIS (ZETT.) (HYMENOPTERA: EULOPHIDAE),
by W. F. Balwin, E. Shaver, and A. Wilkes.
3 Aug 64, 14p AECL-2015

Unclassified report

Pub. in Canadian Journal of Genetics and Cytology, v6 n4 p453-66 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Hymenoptera, Mutations), Life cycle, Larvae, Males, Females, Reproduction (Physiology), Eggs, Genetics, Morphology (Biology), Eye, Colors, Body, Anomalies, Radiation effects, Canada.

The main phenotypic effects of 12 visible mutants are reported in the arrhenotokous wasp, Dahlbominus fuscipennis (Zett.) (Hymenoptera: Eulophidae). All but two of the mutations occurred among haploid males following irradiation of wild females, the others during pedigree breeding of irradiated stock. Eight of the mutations affected pigmentation of the eyes or body, three produced morphological abnormalities in the wings and antennae, and one reversed the sex ratio. All but the last one were controlled by recessive factors, each of which has been assigned a name and symbol. The sex reversing factor was dominant and sex-limited, being transmitted by females to their sons. Although tests for linkages between the mutations have not been completed, in initial crosses between four of the bright eye-colors and the wing mutations, segregation was independent indicating that these arose as separate mutations. An account is given of the life history of the species and a description of the adult and immature stages of the wild stock as a basis for comparison with the mutant lines. A simple method is given for rearing large numbers in the laboratory. (Author)

AD-613 005 Div. 16
CFSTI Prices: HC$4.00 MF$1.00

Naval Ordnance Test Station, China Lake, Calif.
A BIBLIOGRAPHY OF CETACEA, LITERATURE PUBLISHED BETWEEN 1949 AND 1963,
comp. by Ina L. Squire. Dec 64, 120p
NOTS-TP-3686
Task R360FR106 216 1R011 01 01
NAVWEPS 8645

Unclassified report

Descriptors: (*Cetacea, Bibiographies), (*Bibiographies, Cetacea), Reproduction (Physiology), Pathology, Parasites,

Anatomy, Physiology, Biochemistry, Marine biological noise, Behavior, Ecology, Reports.

The bibliography was compiled as part of a continuing program of cetacea research initiated at the Naval Ordnance Test Station. The initial collection of references has been extended to include pertinent literature published between the years 1949 and 1962. It has been assembled in categories designed to assist investigators pursuing specialized aspects of cetacean research.

AD-613 082 Div. 16

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
RADIATION PROTECTION IN CANADA. PART VI. PROBLEMS IN THE ASSESSMENT OF GENETIC DAMAGE FROM EXPOSURE OF INDIVIDUALS AND POPULATIONS TO RADIATION,
by Howard B. Newcombe. 1965, 7p AECL-2140
Unclassified report

Pub. in Canadian Medical Association. Journal v92 p171-6 Jan 23 1965 (Copies available only to DDC users).

Descriptors: (*Radiation hazards, Genetics), (*Genetics, Radiation hazards), Radiation effects, Population, Exposure, Sex glands, Radiological dosage, Lethal dosage, X rays, Mutations, Pathology, Canada.

Estimates of the genetic damage from radiation exposures of human populations are needed in order to set reasonable limits for future exposures. In addition to the three rads per generation received by the gonads from natural sources, a similar amount is currently contributed by medical radiology and a further five rads per generation has been suggested as an upper limit for exposures from the future peaceful uses of atomic energy. Two methods of estimating the genetic damage from such an increase suggest that there might be in the vicinity of 250 to 800 severely affected individuals per year in a population of 20 million people, or within an order of magnitude of the current highway fatality rate for Canada of about 4000 per year. Although the true value may be less, or greater, by as much as tenfold, the effect is in any case large enough to justify continued scrutiny. (Author)

AD-613 083 Div. 16

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
ADENOSINE-TRIPHOSPHATASE AND POTASSIUM RETENTION IN X-IRRADIATED ERYTHROCYTES,
by D. K. Myers and L. Levy. 1964, 4p
AECL-2130
Unclassified report

Pub. in Nature (Gt. Brit.) v204 n4965 p1324-6 Dec 26 1964 (Copies available only to DDC users).

Descriptors: (*Adenosine phosphates, Erythrocytes), (*Erythrocytes, Potassium), (*X rays, Erythrocytes), Cardiac glycosides, Electrolytes (Physiology), Inhibition, Canada.

An investigation was conducted to determine whether ATP-ase inhibition could account for the loss of potassium ion from x-irradiated erythrocytes. However, the loss of potassium ion from irradiated erythrocytes at low temperatures remains unexplained. It was not accompanied either by hemolysis or by loss of acid-soluble ribonucleotide bases. It was also found that the loss is reversible, for when irradiated cells (60 kr) were preincubated a 4C for 20 h and then incubated at 37C for another 4 h, their potassium content increased from 26 to 66% of the original content. This re-accumulation was completely inhibited by 1 mM ouabain. It was also noted that pre-incubation at 37C for another 4 h was sufficient to prevent excess loss of potassium from irradiated erythrocytes during subsequent incubation at 4C. X-irradiation apparently destroys some component of the erythrocytes which they can repair or replace during incubation at 37C but not at 4C. However, the nature of this component has not yet been identified. (Author)

AD-613 085 Div. 16

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
MATERNAL AGE AND BIRTH ORDER CORRELATIONS. PROBLEMS OF DISTINGUISHING MUTATIONAL FROM ENVIRONMENTAL COMPONENTS,
by Howard B. Newcombe and Olwyn G. Tavendale.
16 Jun 64, 22p AECL-2106
Unclassified report

Pub. in Mutation Research (Netherlands) v1 p446-67 1964 (Copies available only to DDC users).

Descriptors: (*Aging (Physiology), Pregnancy), (*Infants, Anomalies), Birth, Diseases, Mutations, Genetics, Statistical analysis, Correlation techniques, Tables, Canada.

The associations of maternal age and birth order differences with differences in the risks of various diseases in the offspring have been studied for eighteen selected conditions using routine registrations of handicapped children, child deaths, and stillbirths, representing a total of 13556 affected individuals. Parental age and birth order information, where missing, was derived by computer 'linkages' of these records with the birth registrations. The analyses revealed examples of special risks to children of young and of old mothers, and to those of low and of high birth ranks. Increased risks with advancing maternal age do not, in general, appear to be associated with increased mutation rates. Shifts in the extents of such age correlations with birth rank point to interpretations in terms of possible environmental and social factors. Parental age studies may nevertheless provide, eventually, the best means available for detection and assessment of the combined consequences of mutations throughout the human genotype as a whole. Other approaches have serious limitations for this purpose, and the present approach is capable of refinement through use of social particulars in conjunction with parental age information. The study represents part of a continuing attempt to make systematic use of organized sources from which such data may be derived on a continuing basis. (Author)

AD-613 088 Div. 16, 30

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
THE REAL-TIME SORTING OF NEURO-ELECTRIC ACTION POTENTIALS IN MULTIPLE UNIT STUDIES,
by William Simon. 24 Jun 64, 4p
Contract DA36 039AMC03200E; Grant GP2495
Unclassified report

Pub. in Electroencephalography and Clinical Neurophysiology (Canada) v18 p192-5 1965 (Copies available only to DDC users).

Descriptors: (*Nerve impulses, Data processing systems), (*Data processing systems, Nerve impulses), Real time, Nervous system, Physiology, Central nervous system, Microminiaturization (Electronics).

Electrodes, Computers, Nerve cells, Programming (Computers).

A description is given of a method by which neuro-electric action potentials recorded simultaneously can be sorted in a moderate size machine in real-time and on-line.

AD-613 092 Div. 16

Naval Hospital, St. Albans, N. Y.
ATTACK-CARRIER MEDICINE,
by Richard G. Fosburg. 1965, 2p
Unclassified report

Pub. in American Medical Association. Journal (U. S.) v191 n2 p231-3 Jan 11 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aircraft carriers, Military medicine), (*Military medicine, Aircraft carriers), Naval personnel, Medical examination, Medical personnel, Medical equipment, Surgery, Dentistry, Ophthalmology, Hospitals, Immunity, Diseases, Treponema pallidum, Neisseriaceae, Sanitary engineering, Food.

AD-613 103 Div. 16

Columbia Univ., New York. Coll. of Physicians and Surgeons.
A STUDY OF THE CROSS-REACTIVITY OF ANTIPURIN-6-OYL SERUM WITH DEOXYRIBONUCLEIC ACID (DNA),
by Vincent P. Butler, Jr., Stuart W. Tanenbaum, and Sam M. Beiser. 19 Aug 64, 20p
Contract Nonr26640; Grant PHS AI01763
Unclassified report

Pub. in Journal of Experimental Medicine (U. S.) v121 n1 p19-38 Jan 65 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Antigen-antibody reactions, Purines), (*Desoxyribonucleic acids, Antigen-antibody reactions), Antigens and antibodies, Proteins (Conjugated), Complement, Serum albumin, Inhibition.

The specificity of the reaction of antipurin-6-oyl sera with thermally denatured DNA has been studied by means of hapten inhibition techniques. The relative order of effectiveness of various haptens as inhibitors of the complement fixation reaction between DNA and antipurin-6-oyl serum was found to be comparable to their relative order of effectiveness as inhibitors of the precipitin reaction between purin-6-oyl-protein conjugates and and antipurin-6-oyl serum. Antipurin-6-oyl antibody has been purified and has been shown to be capable of reacting with thermally denatured DNA. It is concluded that the reactivity of these purine-specific antisera with DNA is a property of antibody with specificity for the purin-6-oyl moiety. In addition, the reaction between antipurinoyl sera and DNA has been demonstrated by the techniques of radioimmunoelectrophoresis and passive cutaneous anaphylaxis. (Author)

AD-613 106 Div. 16

Western Ontario Univ., London (Ontario).
TISSUE ENZYME RESPONSE TO COLD AND TO HYPERPHAGIA IN THE RAT,
by John R. Beaton and V. Feleki. 16 Jun 64, 5p
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology, v42 p787-91 1964 (Copies available only to DDC users).

Descriptors: (*Enzymes, Low-temperature research), (*Exposure, Adaptation (Physiology)), Tissues (Biology), Thalamus, Body weight, Liver, Kidneys, Carbohydrates, Metabolism, Rats, Canada.

In rats exposed to cold (5C) for 14 days the activities of liver arginase, alanine-transaminase, and glucose-6-phosphatase and of kidney phosphate-activated glutaminase were increased. In animals with a comparable hyperphagia due to bilateral ablation of the ventromedial region of the hypothalamus there was a smaller although significant increase in activity of kidney glutaminase but, in contrast to the effect of cold exposure, there was a significant decrease of liver alanine-transaminase activity and no apparent effect upon the activities of liver arginase or glucose-6-phosphatase. It is concluded that changes of enzyme activities in cold-exposed rats are not simply an adaptation to the increased nutrient flow consequent upon the hyperphagia induced. (Author)

AD-613 107 Div. 16

Western Ontario Univ., London (Ontario).
ACTIVITY AND PATTERNS OF RATS FED A LOW-PROTEIN DIET AND THE EFFECTS OF SUBSEQUENT FOOD DEPRIVATION,
by J. R. Beaton, V. Feleki, and J. A. F. Stevenson. 28 Jan 64, 14p
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v42 p705-718 1964 (Copies available only to DDC users).

Descriptors: (*Starvation, Rats), Diet, Nutrition, Proteins, Casein, Food, Body weight, Temperature, Behavior, Canada.

Rats previously fed a low-protein diet (5% casein) survive deprivation of food for a shorter period than do animals fed an adequate diet (20% casein) even though this be fed in isocaloric amounts. The present investigation examined effects of feeding a low-protein diet and of subsequent survival during food deprivation under various conditions: in activity and standard cages, in temperate (23C) and cold (5C) environments. During feeding, those animals provided with the low-protein diet did not exhibit a total running activity or activity pattern markedly different than those of pair-fed controls. The results revealed that the shorter survival in cold or temperate environment after a low-protein diet is not attributable to differences in (a) total running activity or activity pattern, (b) feeding pattern, or (c) previous caloric intake and weight change. It was also noted that rats in activity cages do not eat or gain as much as rats in standard cages. (Author)

AD-613 108 Div. 16

Toronto Univ. (Ontario).
ACUTE TOXICITY STUDIES ON ETHANOL, PROPANOL, AND BUTANOL,
by D. C. MacGregor, E. Schonbaum, and W. G. Bigelow. 27 Apr 64, 8p
Grant DRB9325 10
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v42 p689-96 1964 (Copies available only to DDC users).

Descriptors: (*Toxicity, Alcohols), (*Alcohols, Toxicity), Propanols, Butanols, Parenteral infusions, Dosage, Blood analysis, Blood pressure, Pulse rate, Electrocardiography, Toxic tolerances, Tables, Dogs, Canada.

Three series of 10 dogs each were used to study the effects of intravenously administered ethanol, propanol-1, and butanol-1. In normothermic dogs, with supported respiration and nitrous oxide anaesthesia (after induction), the mean lethal doses for ethanol, propanol-1, and butanol-1 were 4.90, 2.42, and 1.26 g/kg respectively. At a constant infusion rate, the blood alcohol levels increased almost linearly with time. Relationships between ethanol, propanol-1, and butanol-1 blood levels and blood pressure, pulse, and electrocardiogram were established. Two minutes cardiac standstill occurred at the following blood levels: ethanol, 1499 mg/100 ml; propanol-1, 713 mg/100 ml; butanol-1, 279 mg/100 ml. (Author)

AD-613 109 Div. 16

Naval Medical Field Research Lab., Camp Lejeune, N. C.
EFFECT OF pH ON HUMAN MYCOPLASMA STRAINS.
Vol. 15, No. 8,
by Maurice C. Shepard and Carl D. Lunceford.
23 Jun 64, 8p
Proj. MR005 09 1501 1 6
Unclassified report

Pub. in Journal of Bacteriology (U.S.) v89 n2 p265-70 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*PH, Mycoplasma), (*Mycoplasma, Culture media), Humans, Growth.

The optimal reaction of culture media for the cultivation of T-strain Mycoplasma of human origin was investigated. By use of a recently modified tryptic digest medium, the optimal reaction in either agar or fluid medium was found to be pH 6.0. In contrast, human classic (large-colony) Mycoplasma could be cultivated in agar or fluid medium over a rather broad pH range, and the influence of the reaction of the medium appeared to be primarily species-dependent. M. salivarium, for example, grew best in agar from pH 5.5 through 6.5. M. pneumoniae (Eaton's agent) yielded largest colony numbers in agar and highest titers in broth at pH 8.0. In the case of T-strain Mycoplasma, both maximal colony numbers in agar and highest titers in fluid media were achieved at a reaction of pH 6.0. In addition, largest colony size of T-strain Mycoplasma was also achieved in agar at pH 6.0, and averaged 50 to 100% larger than that obtained by cultivation at pH 8.0 with the same medium. Although T-strains will develop in agar media over a pH range of from 5.0 through 10.0, the extremely small colony size and poor staining properties resulting from growth in an alkaline medium make their recognition in agar cultures difficult. Aerobic cultivation of T-strains was first achieved in agar adjusted to pH 5.5 to 6.0. In fluid medium, multiplication of T-strains occurred only within the limits of pH 5.0 through 8.0, with highest titers being reached at pH 6.0. Greater attention to the reaction of complete Mycoplasma media is stressed. (Author)

AD-613 121 Div. 16

Toronto Univ. (Ontario).
SOME EFFECTS OF INSULIN ON THE BLOOD SUGAR AND INORGANIC PHOSPHORUS LEVELS OF NORMOTHERMIC AND HYPOTHERMIC RATS,
by Anne L. Crawford and R. E. Haist. 9 Dec 63, 10p
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p137-46 1965 (Copies available only to DDC users).

Descriptors: (*Insulin, Hypothermia), (*Hypothermia, Blood chemistry), Blood, Glucose, Phosphorus, Hematocrit, Body temperature, Rats, Canada.

Blood sugar, inorganic phosphorus, and hematocrit values were measured in hypothermic and normothermic untreated rats and rats injected subcutaneously with insulin. In hypothermic rats the inorganic phosphorus levels were higher than in normothermic animals. The injection of 0.5 units of insulin per kilogram of body weight into fasted normothermic rats caused a significant fall in blood sugar level, but this rose again within 3 hours. The administration of the same amount of insulin to fasted or fed hypothermic rats (colonic temperature of 25C) led to a significant fall in blood sugar level, with little tendency for this to rise again at 3 or even at 6 hours. At a body temperature of 20C the blood sugar levels continued to fall until very low values were reached. When 0.2 units insulin/kg was injected there was very little hypoglycaemic effect in normothermic rats, but in hypothermic rats (25C) a hypoglycaemic effect similar to that obtained with 0.5 units was observed for the first 3 hours, but a significant return toward the initial level was evident by 6 hours. The blood inorganic phosphorus changes after the injection of insulin were not very dramatic and not greatly different in normothermic and hypothermic rats. (Author)

AD-613 122 Div. 16

Toronto Univ. (Ontario).
THE SPECTRUM OF PLASMA ESTERASE ACTIVITY IN YOUNG, OLD, AND COLD-ACCLIMATED RATS,
by D. G. Baker, R. Ghys, D. Coles, and S. Christie.
10 Jun 64, 5p
Unclassified report

Pub. in Canadian Journal of Biochemistry v42 p1711-5 (Copies available only to DDC users).

Descriptors: (*Carboxylic ester hydrolases, Band spectrum), (*Aging (Physiology), Carboxylic ester hydrolases), (*Acclimatization, Carboxylic ester hydrolases), Proteins, Metabolism, Blood plasma, Exposure, Rats, Canada.

Qualitative changes occurred in the spectrum of plasma esterase activity with increasing age. The trend was toward a decrease in the number of specific proteins having esterase activity. Acclimation to cold did not accelerate the onset of this trend. In the plasma esterase activity during acclimation to cold, there were no changes which would suggest accelerated aging. (Author)

AD-613 124 Div. 16

Michigan Univ., Ann Arbor.
DNA SYNTHESIS IN HUMAN SKIN STUDIED IN VITRO BY AUTORADIOGRAPHY,
by Kimie Fukuyama, Toshio Nakamura, and I. A. Bernstein. 29 Jan 64, 5p
Contract Nonr122435
Unclassified report

Pub. in Journal of Investigative Dermatology (U. S.) v44 n1 p29-32 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Autoradiography, Skin), (*Skin, Desoxyribonucleic acids), (*Desoxyribonucleic acids,

Synthesis), Tissues (Biology), Cells (Biology), Nuclei (Biology), Pathology, Histological techniques, Labeled substances.

A method has been described for studying the synthesis of DNA in human skin, in vitro, by autoradiography. The technic has been applied to normal skin biopsy specimens and to specimens from eczematous and verrucous lesions. In the normal skin, DNA synthesis was observed in nuclei of the basal layers as well as the cells above the basal layer. The number of labeled cells was abnormally high in the verrucous and eczematous lesions. (Author)

AD-613 134 Div. 16

Delaware Univ., Newark.
SOME CONTRIBUTIONS OF EXOTIC ANIMALS TO BIOMEDICAL RESEARCH,
by Charles G. Wilber. 1964, 4p
Contract AF41 609 1973
Unclassified report

Pub. in Bioscience (U. S.) v14 n10 p21-4 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Medical research, Laboratory animals), (*Laboratory animals, Medical research), Physiology, Space medicine, Genetics, Neurology, Biochemistry, Pharmacology, Vision, Reproduction (Physiology), Heat production (Biology), Heart, Chimpanzees, Fishes, Amphibians, Cephalopoda.

AD-613 135 Div. 16

Army Tropical Research Medical Lab., APO 851, New York.
FETAL HEMOGLOBIN CONCENTRATION IN THE NEWBORN, INDEX OF MATURITY AND AS SUPPORTIVE EVIDENCE FOR MATERNAL FETAL TRANSFUSION,
by Billy F. Andrews and Gloria P. Willet. 1964, 4p
Unclassified report

Pub. in American Journal of Obstetrics and Gynecology (U. S.) v91 n1 p85-8 Jan 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Infants, Hemoglobin), (*Hemoglobin, Infants), Embryos, Pregnancy, Birth, Body weight, Hematocrit, Erythrocytes, Blood counts.

Per cent fetal hemoglobin concentration was determined on 407 cord specimens. Values were grouped according to the gestational age and weight of the infants as follows: Group I, 105, under 38 weeks' gestation, mean 87.8, range 55-98. Group II, 280, 39 to 41 weeks' gestation, mean 79.6, range 47-95. Group III, 22, 42 weeks' gestation and over, mean 63.6, range 42-84. Group IV, 45, under 2,500 grams, mean 85.8, range 55-98. Group V, 362, over 2,500 grams, mean 80.2, range 42-95. The total group mean was 80.8 with a range of 42-98 per cent. Two infants with postmaturity syndrome had low fetal hemoglobin. Two infants with low fetal hemoglobin for gestational age and weight had gross maternal fetal transfusion. One died and had hyaline membranes. A single fetal hemoglobin determination should not be used as an index of maturity or for the diagnosis of maternal-fetal transfusion or post-maturity syndrome although it can be used as supportive evidence. (Author)

AD-613 136 Div. 16

Variety Children's Research Foundation, Miami, Fla.
AN INTERFERON PRODUCED IN RESPONSE TO INFECTION BY HERPES SIMPLEX VIRUS,
by M. J. Fruitstone, G. H. Waddell, and M. M. Sigel.
15 Jun 64, 4p
Contract Nonr331000; Grant PHS5T1CA5075
Unclassified report

Pub. in Society for Experimental Biology and Medicine. Proceedings (U. S.) v117 p804-7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Herpes simplex virus, Inhibition), (*Antigens, and antibodies, Herpes simplex virus), Embryonated egg technique, Vaccines, Chemical properties, Physical properties, Infections.

The production of an interferon-like substance by chick embryos infected with herpes simplex virus is described. The physical, chemical, and biological properties of herpes interferon are demonstrated to be similar to those of previously reported interferons. Speculation is made on the possible role of interferon in the classic example of latency in humans--infection by herpes simplex virus. (Author)

AD-613 152 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
HISTOPATHOLOGIC FINDINGS IN EYES WITH PARALYSIS OF THE OCULOMOTOR (THIRD) NERVE,
by Robert H. Fenton and William S. Hunter.
9 Jul 64, 5p
Unclassified report

Pub. in Archives of Opthalmology (U.S.) v73 p224-8 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Eye, Pathology), (*Cranial nerves, Paralysis), Autonomic nervous system, Histological techniques, Muscles, Vision, Ophthalmology.

The histologic examination of two eyes with longstanding third cranial nerve denervation revealed selective loss of the circular portion of the ciliary muscle. The longitudinal and radial portions of the muscle were intact. The sphincter muscle of the iris was hypoplastic in one eye and atrophic in the other. The findings, in both eyes, lend support to the concept of a dual nerve supply to the ciliary muscle, with sympathetic innervation to the longitudinal and radial portions and parasympathetic excitatory innervation to the circular portion. (Author)

AD-613 153 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
INTRAMUSCULAR MYXOMA. A REVIEW AND FOLLOW-UP STUDY OF 34 CASES,
by Franz M. Enzinger. 13 Apr 64, 11p
Unclassified report

Pub. in American Journal of Clinical Pathology (U. S.) v43 n2 p104-13 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Neoplasms, Muscles), (*Muscles, Neoplasms), Pathology, Tissues (Biology), Mucus, Cancer, Diagnosis, Excision, Histological techniques, Therapy.

The clinicopathologic features of 34 myxomas arising primarily in muscle are analyzed and presented. The usually painless tumor affected chiefly patients in the

fifth and sixth decades of life, women slightly more often than men. The tumor was rare in young adults and was not observed in children. It was usually unencapsulated and often diffusely infiltrated the adjacent muscle. The microscopic characteristics were fairly uniform and consisted chiefly of a richly mucoid but poorly vascularized matrix and relatively few and inconspicuous cells. Secondary changes such as fibrosis were minimal, and their degree could not be related to the given clinical duration. The differential diagnosis from other mucoid neoplasms is briefly discussed. Follow-up information obtained on 33 patients failed to reveal any evidence of aggressive behavior or a tendency toward local recurrence, in spite of the fact that 29 of the 33 patients were treated solely with simple local excision. (Author)

AD-613 154 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.

MELANOCYTES, MELANOCYTIC NEVI, AND MELANOCYTOMAS. THE JONAS S. FRIEDENWALD MEMORIAL LECTURE,
by Lorenz E. Zimmerman. 1964, 31p
Grant PHS TG5379 03

Unclassified report

Pub. in Investigative Opthalmology (U.S.) v4 n1 p11-41 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Eye, Pathology), (*Neoplasms, Eye), Ophthalmology, Cancer, Retina, Cells (Biology), Morphology (Biology), Vision, Histological techniques.

Concepts concerning melanocytes and certain melanocytic tumors are reviewed. Some ideas are also presented about a distinctive group of benign melanocytic tumors which have often been mistaken by both ophthalmologists and pathologists for malignant melanoma. The term 'melanocytoma' is given to these tumors, but it is suggested that biologically they might also be considered melanotic progonomas.

17. Metallurgy

AD-612 462 Div. 17, 26
CFSTI Prices: HC$1.00 MF$0.50

Watervliet Arsenal, N. Y.
STRESS-AGING: A NEW TREATMENT FOR ALLOYS. PART III. EFFECT ON STANDARD TENSILE PROPERTIES OF FOUR ULTRA-HIGH-STRENGTH STEELS.
Technical rept.,
by R. H. Harrington. Feb 65, 38p Rept. no. WVT-6501
Proj. 1L013001A91A
See also AD-609 243. Unclassified report

Descriptors: (*Aging (Materials), Steel), (*Stresses, Aging (Materials)), (*Steel, Tensile properties), Heat treatment, Toughness, Elasticity, Strain (Mechanics), Ductility, Metallography.

Stress-Aging (a new treatment) effects considerable improvement in standard strength properties for four Ultra-High-Strength Steels, (4340 Air-Melted, 4340 Vacuum-Melted, 4335 Si-Modified and 300M), without effective concurrent losses of elongation, reduction of area, or relative toughness. Respectively, stress-aging results in the following increases in strenth properties: (a) Proportional limit: 42,300; 37,300; 72,500; and 75,000 psi; (b) Elastic capacity: 48%, 36%, 100% and 90%; (c) 0.1% offset yield strength: 40,000; 35,000; 56,500; and 62,000 psi. These properties are in parallel with the direction of the externally applied elastic stress. It is conjectured that these increases in strength properties may be due to strain-induced (sub-micron) precipitation of nickel-silicides and increased carbides, reacting with dislocations. (Author)

AD-612 477 Div. 17, 26
CFSTI Prices: HC$2.00 MF$0.50

Titanium Metals Corp. of America, New York.
DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY.
Quarterly rept. no. 8, 1 Apr-30 Jun 64,
by D. B. Hunter. 30 Jun 64, 35p
Contract DA30 069ORD3743, Proj. 59332008
WAL TR-405-2-7
See also AD-608 281 Unclassified report

Descriptors: (*Titanium alloys, Dispersion hardening), (*Dispersion hardening, Titanium alloys), Vanadium alloys, Chromium alloys, Aluminum alloys, Silicon alloys, Manganese alloys, Molybdenum alloys, Iron alloys, Cobalt alloys, Aging (Materials), Heat treatment, Microstructure, Brittleness, Hardness, Rolling (Metallurgy), Tensile properties, Creep, Ductility, Quenching (Cooling).

The upper temperature limit for obtaining a hardness response from Ti-17V-10Cr-3Al-1Si, quenched from the beta field, was 1300-1350F. Brittleness in such alloys is partly ascribed to the large grain size, produced by the high temperatures necessary for silicide solution. Cold rolling pressure determinations were made on stable-beta alloys Ti-8Mo-8V-6Fe-3Al and Ti-17V-10Mn-3Al. Tensile tests on minor compositional variations of Ti-17V-4Fe-3Al and Ti-8Mo-8V-2Fe-3Al indicated that a high proportion of alpha stabilizing elements resulted in a faster aging response. Statistical determination of the Vickers hardness/UTS relationship showed that in both alloys 17 Vickers points equaled 10,000 psi. Complete substitution of Co for Fe in two stable-beta alloys resulted in such alloys becoming ageable. (Author)

AD-612 487 Div. 17, 26
CFSTI Prices: HC$4.00 MF$1.00

Westinghouse Electric Corp., Blairsville, Pa.
THE PRIMARY WORKING OF REFRACTORY METALS.
Final rept. for 1 Jun 63-31 Jul 64,
by Daniel R. Carnahan and Vincent DePierre.
Nov 64, 135p
Contract AF33 616 8325, Proj. 7351, Task 735101
ML TR-64-387
Unclassified report

Descriptors: (*Refractory metal alloys, Extrusion), (*Extrusion, Refractory metal alloys), Tungsten alloys, Molybdenum alloys, Titanium alloys, Zirconium alloys, Carbon alloys, Niobium alloys, Powder alloys, Microstructure, Deformation, Dies, Loading (Mechanics), Surface properties, Mechanical working, Friction, Mechanical properties, Tungsten, Thorium compounds, Oxides.

Three inch diameter billets of sintered W+2%ThO2 and cast tungsten, molybdenum and columbium alloys were heated to temperature ranges of 2400F to 4000F and extruded by a 700 ton instrumented press through 60, 90 and 120 degree dies into 1 . 15 in to 1 . 75 in diameter bars. The extrusion techniques were evaluated by correlating deformation loads and extrusion properties with processing variables. Die load data were evaluated by the relation, die load divided by cross-sectional area of the upset billet equals an extrusion factor multiplied by the natural logarithm of the reduction ratio. Surface soundness of extruded bars are a function of processing variables and billet material characteristics. Apparent coefficients of friction in the liner were calculated, ranged from .015 to .205 and tended to increase with extrusion temperature.

AD-612 620 Div. 17, 26, 31
CFSTI Prices: HC$2.25 MF$0.75

Naval Research Lab., Washington, D. C.
METALLURGICAL CHARACTERISTICS OF HIGH STRENGTH STRUCTURAL MATERIALS.
Quarterly interim rept. no. 6, Sep-Dec 64,
by W. S. Pellini, R. J. Goode, R. W. Huber, D. G. Howe, and R. W. Judy. Dec 64, 97p Rept. no. NRL-6258
Projs. SR007 01 02 0704, RR007 01 46 5405
Unclassified report
See also AD-608 940.

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Submarine hulls), (*Titanium alloys, Submarine hulls), (*Aluminum alloys, Submarine hulls), (*Nickel alloys, Submarine hulls), Beryllium alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Niobium alloys, Tantalum alloys, Hulls (Marine), Extrusion, Diffusion bonding, Toughness, Fracture (Mechanics), Heat treatment, Castings, Mechanical properties, Corrosion, Microstructure, Tests, Fatigue (Mechanics).

A progress report covering research studies in high strength hull structural materials, conducted in the period September 1964 to December 1964, is presented. Included in the report are fracture toughness studies on: (1) titanium alloys as related to processing variables (including diffusion-bonding), thickness, and heat-treatment, (2) aluminum, (3) high strength steels relating primarily to the 5Ni-Cr-Mo-V steels, and (4) a nickel-beryllium alloy. Low cycle fatigue crack propagation studies on several titanium alloys are presented as well as a general review of the status of the titanium casting industry. The U. S. Naval Research Laboratory's new 240,000 ft-lb laboratory drop-weight bulge testing facility is described and a preliminary correlation of the

results obtained with it and the explosion bulge test are presented. The results of a study using fatigue cracked and side notched Charpy specimens in impact and slow bend testing on a wide variety of steels is given. (Author)

AD-612 629 Div. 17, 25, 30
CFSTI Prices: HC$1.00 MF$0.50

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
MAGNETIC AND STRUCTURAL PROPERTIES OF PRECIPITATING FERROMAGNETIC SYSTEMS.
Final rept. for 1 Jan 57-31 Dec 61,
by P. J. Flanders. 31 Dec 61, 9p Rept. no. F-A2026
Contract AF49 638 159
AFOSR 2345

Unclassified report

Descriptors: (*Alloys, Phase studies), (*Ferromagnetic materials, Alloys), (*Phase studies, Metallography), (*Magnetic properties, Phase studies), Crystal structure, X-ray diffraction analysis, Electron microscopy, Heat treatment, Gold alloys, Nickel alloys, Brass, Iron alloys, Powder metallurgy, Anisotropy, Particles, Foils.

Magnetic investigation of the precipitating systems proved to be a sensitive means by which the structural properties of the alloys could be determined. These structural properties could be examined during the earliest stages of anneal with a degree of precision not possible when standard techniques are employed. Whereas electron microscope and x-ray studies confirmed many of these magnetic findings, further efforts would be desirable in this direction, particularly microscope examination of thin foils to determine particle orientation. The experimental torque magnetometer method for the examination of anisotropy and orientation has proved to be a potentially powerful tool and it would be of continued interest and value if applied to other precipitating alloy systems. This technique has applications which extend beyond the study of precipitating alloys into the field of powder ferromagnetism. (Author)

AD-612 652 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center,
Redstone Arsenal, Ala.
EFFECT OF ELECTRIC CURRENT ON THE DIFFUSION OF IONS IN OXIDE LAYERS,
by F. Schein, B. Le Boucher, and P. Lacombe.
Feb 65, 14p RSIC-374
TT 65-61836

Unclassified report

Trans. of Corrosion et Anticorrosion (France) 1962, v. 10, no. 12, p. 401-407.

Descriptors: (*Oxides, Diffusion), (*Diffusion, Ions), (*Metals, Corrosion), Electron fields, Oxidation, Iron, Cathodes (Electrolytic cell), Electrolysis, Films, France, Electric currents.

After showing why this study is important, the authors describe the experimental technique and summarize the results. They have noted a change in the law of oxidation beyond a certain current density and a certain duration of electrolysis, and were able to determine the critical conditions of the appearance of this change. Without being able to interpret these results, the authors point out that the passage of a current in an oxide offers a theoretical tool for the study of oxidation processes, and furnishes a practical means for slowing down the oxidation of metals. Communication presented to the 'European Corrosion Meeting', organized in the framework of the International Chemical Arts Conference, Paris, 25 April-4 May 1962.

AD-612 696 Div. 17
CFSTI Prices: HC$3.00 MF$0.75

Brush Beryllium Co., Cleveland, Ohio.
INVESTIGATION OF THE MECHANICAL CHARACTERISTICS OF ZONE-LEVELED BERYLLIUM.
Technical rept. for 1 Jan-30 Sep 64,
by J. A. Carrabine, A. J. Stonehouse, D. G. Fetsko, and W. W. Beaver. Jan 65, 70p BBC-TR-376-244
Contract AF33 615 1177, Proj. 7351, Task 735104
ML TR-64-388

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Zone melting, Beryllium), (*Beryllium, Zone melting), Single crystals, Mechanical properties, Impurities, Silicon, Aluminum, Titanium, Metallography, Microstructure, Optical analysis.

Zone-leveling has been shown to produce beryllium single crystals of intermediate purity, having moderately high basal glide capacity, while retaining reasonably high strength. Properties of the zone-leveled crystals are dependent upon zone travel rate, but not upon the number of zone passes. The enhanced basal glide corresponds to an agglomeration of insoluble impurities, and a retention of the soluble elements in solid solution. The process results in some bulk purification, but does not alter significantly the plastic anisotropy of the crystals. Application of the zone-leveling concepts, in a modified manner, to commercial hot-pressed polycrystalline metal has resulted in an improvement in room-temperature tensile elongation, with only minor strength alterations. The implication of these results is that a refinement of the thermal and chemical parameters involved in the process could possibly lead to a materially improved engineering metal of available purity, thus precluding the high-purity approach. (Author)

AD-612 712 Div. 17, 25
CFSTI Prices: HC$3.00 MF$0.75

Institute for the Study of Fatigue and Reliability, Columbia Univ., New York.
ON SECOND ORDER STRAIN ACCUMULATION IN TORSION FATIGUE,
by Maria Ronay. Feb 65, 60p
Technical rept. no. TR-16
Contract Nonr26691, Proj. NR064 470

Unclassified report

Descriptors: (*Aluminum, Fatigue (Mechanics)), (*Iron, Fatigue (Mechanics)), (*Fatigue (Mechanics), Strain (Mechanics)), Stresses, Fracture (Mechanics), Hardening, Propagation, Mathematical analysis.

Superpurity aluminum specimens subject to reversed cyclic torsion are extending in axial direction because of the accumulation of second order plastic strain increments in quasi-isotropic strain-hardening metals arising from the quadratic term in their stress-strain relation required by the condition of tensorial invariance. Accordingly, a quadratic relation was found between the accumulated second order axial strain to the start of macroscopic crack propagation and the reversed torsion angle pro-

ducing it. Second order strain accumulation was also found in Armco iron both below and above the yield range, in the regions where stress-strain relations exist; within the yield range which is governed by a yield condition, axial strain accumulation is erratic. For aluminum and Armco iron a linear relation exists between the accumulated axial strain at any torsion angle and the applied axial stress. Fatigue life was related to the second order strain accumulation. (Author)

AD-612 759 Div. 17, 14, 26
CFSTI Prices: HC$2.00 MF$0.50

Southern Research Inst., Birmingham, Ala.
MECHANICAL AND PHYSICAL PROPERTIES OF TZM MOLYBDENUM ALLOY SHEET AND OF TUNGSTEN SHEET.
Quarterly progress rept. no. 9, 1 Dec 64-1 Mar 65,
by Paul G. Adams and Clifford L. Dotson. 19 Mar 65,
35p Rept. no. 7221-1479-IX
Contract N600 19 59530

Unclassified report

See also AD-610 564.

Descriptors: (*Molybdenum alloys, Sheets), (*Refractory metal alloys, Sheets), (*Tungsten, Sheets), Coatings, Titanium alloys, Zirconium alloys, Carbon alloys, Tensile properties, Physical properties, Compressive properties, Transition temperature, Deformation, Recrystallization, Thickness, Mechanical properties.

Bend-transition temperature evaluations were made on recrystallized and coated TZM specimens in the longitudinal and transverse directions. Room-temperature compression (longitudinal and transverse) evaluations of the 0.040-inch TZM sheet, in the optimum and recrystallized conditions, were completed as specified in the original scope of the program. Elevated-temperature unnotched-tensile evaluations at 1200 F and 2000 F were completed on the 0.016-, 0.020-, 0.040- and 0.060-inch TZM sheet in the optimum condition and longitudinal direction as outlined in the extended phase of the TZM program. The evelated-temperature compression properties were determined from different thicknesses of the tungsten sheet at selected temperatures.

AD-612 786 Div. 17
CFSTI Prices: HC$3.00 MF$0.75

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PLASTIC DEFORMATION AND MARTENSITIC TRANSFORMATION IN IRON ALLOYS.
Final rept. for Jan 63-Dec 64,
by John F. Breedis, Alan Lawley, and John D. Meakin.
Feb 65, 85p Rept. no. F-B2052
Contract AF33 657 10205, Proj. 7353, Task 735302
ML TR-65-49

Unclassified report

Descriptors: (*Stainless steel, Martensite), (*Martensite, Phase studies), (*Deformation, Martensite), Electron microscopy, Chromium alloys, Nickel alloys, Transformations, Microstructure, Austenite, Crystal lattice defects, Single crystals, Surface properties.

An electron transmission study has been made of the martensite transformation in a series of stainless steels. The influence of chemical composition on martensite morphology has been investigated and the composition ranges which transform to lath, surface and plate martensite determined. Using polycrystalline samples of two compositions which transform to lath martensite, an investigation was conducted into the influence of prior plastic deformation on martensite formation. This is of course a contribution to the fundamental understanding of the ausforming process. A further investigation in this area was an examination of the transformation which occurs during plastic deformation at temperatures approaching the M sub s. These experiments were performed on single crystals of the composition Fe-17Cr-16Ni. Finally, transmission studies were carried out to determine the processes occuring during reversion of an Fe-16Cr-12Ni alloy heated in the temperature range 500 to 900 C. (Author)

AD-612 881 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Watervliet Arsenal, N. Y.
HYDROSTATIC PRESSURE INDUCED PLASTIC FLOW IN POLYCRYSTALLINE METALS.
Technical rept.,
by T. E. Davidson, J. C. Uy, and A. P. Lee.
Dec 64, 17p Rept. no. WVT-6431
Proj. 1C014501B32A

Unclassified report

Descriptors: (*Metals, Deformation), (*Deformation, Metals), (*Hydrostatic pressure, Deformation), Cadmium, Zinc, Bismuth, Tin, Zirconium, Magnesium, Copper, Iron, Microstructure, Anisotropy, Compressive properties.

The effects of hydrostatic pressures to 26 kbars on the microstructure of polycrystalline Cd, Zn, Bi, Sn, Zr, Mg, Cu, and Fe were examined. Pressure induced microscopic plastic flow in the form of boundary migration, slip, multiple slip or twinning have been observed either singly or in combination in Cd, Zn, Bi and Sn. No deformation was observed in Zr, Mg, Cu, and Fe. The occurrence of such deformation, in terms of its intensity and initiation pressure, relates directly to the degree of anisotropy in the linear compressibility. Pressure cycling does not significantly affect the residual tensile properties of a Zn alloy which exhibits pressure-induced deformation similar to that of pure Zn. (Author)

AD-612 912 Div. 17, 30
CFSTI Prices: HC$12.10 MF$3.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
ELECTRON FRACTOGRAPHY HANDBOOK.
Final rept. for 10 May 63-31 Jan 65,
by B. V. Whiteson, A. Phillips, and W. Kerlins.
31 Jan 65, 910p
Contract AF33 657 11127, Proj. 7381, Task 738103
ML TR-64-416

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Fractography, Handbooks), (*Electron microscopy, Fractography), Fracture (Mechanics), Fatigue (Mechanics), Environmental tests, Experimental data, Test methods, Metals, Aluminum alloys, Steel, Titanium alloys, Nickel alloys, Magnesium alloys, Beryllium alloys, Molybdenum allpys, Niobium alloys, Tantalum alloys, Tungsten alloys, Bibliographies, Microstructure.

The Handbook is divided into five sections. These are: (1) Techniques - A detailed description of the most commonly used replication techniques, fracture analysis techniques, and a guide to distinguish false or 'artifact' structure.

(2) Fracture modes - A guide to the various modes of fracture (or fracture morphology), their appearance in the electron microscope, and a glossary of terms commonly used in electron fractography. (3) Environmental effects - A review of the role of environmental influence on the fracture appearance. (4) Atlas of electron fractographs - A detailed compilation of over 300 specimens failed under known conditions, with the related fractographs. A general index as well as a complete cross-referencing index is also included to provide easy access to information related to specific alloy, strength level, type of test and/or environment and test temperature. (5) Bibliography - A bibliography of open literature related to the field of electron fractography.

AD-613 004 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Watervliet Arsenal, N. Y.
OXIDATION OF IRON-ALUMINUM ALLOYS IN THE TEMPERATURE RANGE 500-900C.
Technical rept.,
by F. Saegusa and L. Lee. Mar 65, 29p WVT-6509
Proj. 1C024401A110 06

Unclassified report

Descriptors: (*Iron alloys, Aluminum alloys), (*Oxidation, Iron alloys), Aluminum alloys, High-temperature research, Oxides, Aluminum compounds, Iron compounds, Metallography, Gravimetric analysis, Electron diffraction analysis, Surface properties.

The Oxidation of 1, 3, 5 weight percent aluminum-iron alloys in oxygen has been investigated at one atmospheric pressure over the temperature range 500 - 900C. The effect of temperature and alloy composition on the oxidation rate was determined by the gravimetric method. The scales formed on the alloy surfaces were examined using the technique of metallography, electron diffraction and electron microprobe analyses. The rate of oxidation decreased with increasing aluminum content and decreasing temperature. The oxidation followed approximately the parabolic rate law at the initial period of reaction. Microscopic examination of the oxidized specimens revealed the existence of two and three layers after oxidation at 500 and 600C, respectively. The inner layer contained a higher aluminum content. The oxidation at 700 - 900C gave a non-adherent outer layer in grey color. In areas where the oxide had spalled off, an adherent oxide layer was exposed. Small nodules with whiskers were observed at randomly distributed positions. Electron diffraction analysis of the surface of the 5 percent Al-Fe alloy indicated that the oxidation products consisted of a mixture of oxides. (Author)

AD-613 023 Div. 17, 1, 12, 14, 26
CFSTI Prices: HC$2.00 MF$0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
REFRACTORY METALS AN ASSESSMENT.
Summary technical rept.,
by Harris M. Burte, Thomas D. Cooper, and Jerome K. Elbaum. Jan 65, 45p ML-TR-64-334
Projs. 7351, 7312, Tasks 735101, 731202

Unclassified report

For presentation at the Annual Meeting (1st.) of the American Institute of Aeronautics and Astronautics, 29 Jun-2 Jul 64, held at Washington, D. C.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Aerospace craft, Refractory metals), (*Refractory metals, Aerospace craft), (*Refractory metal alloys, Aerospace craft), Niobium alloys, Molybdenum alloys, Tantalum alloys, Tungsten alloys, Melting, Transition temperature, Ductility, Brittleness, Oxidation, Coatings, Rocket components, Rocket motors, Joining, Density, Rupture, Solubility, Impurities, Material forming.

The refractory metals (columbium, molybdenum, tantalum, tungsten) and their alloys offer attractive potential as metallic materials for high temperature applications. Their general characteristics (e.g., high melting point, ductile-brittle transition, oxidation characteristics) are discussed in relation to a critical assessment of the feasibility of their use in current and future aerospace applications. Coatings for oxidation protection, fabrication, and joining, are shown to be areas of technology limiting the use of these materials, and therefore requiring further efforts. In spite of the current limitations, the high temperature capability is being utilized and for some future applications, improvements in strength, ductility, and coating characteristics are expected to increase reliability and capability. (Author)

AD-613 046 Div. 17
CFSTI Prices: HC$4.00 MF$0.75

Westinghouse Electric Corp., Bloomfield, N. J.
PHYSICAL METALLURGY OF TUNGSTEN AND TUNGSTEN BASE ALLOYS; PART 5.
Interim rept. for 1 Jun 63-30 Apr 64,
by Heinz G. Sell, George W. King, Randolph H. Schnitzel, and N. Francis Cerulli. Aug 64, 107p
Contract AF33 657 8247, Proj. 7351, Task 735101
WADD TR-60-37, P5

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-423 841.

Descriptors: (*Tungsten, Metallurgy), (*Tungsten alloys, Metallurgy), Powder metallurgy, High-temperature research, Tensile properties, Thorium compounds, Oxides, Tantalum compounds, Rhenium alloys, Hafnium compounds, Nitrides, Ductility, Carbides, Single crystals, Phase studies, Stresses, Thermochemistry, Hardening, Recrystallization, Microstructure, Heat treatment, Rolling (Metallurgy).

Tensile properties of high purity powder metallurgy tungsten and W-1% ThO2 alloy were determined at various strain rates and temperatures (800-2400 C). 1% ThO2 imparts a slight overall increase in strength properties, although above 0.5 T sub m these properties are affected by void formation. The tensile properties of pure W and W-0.35% Ta single crystals (worked, and worked and recrystallized) investigated from R.T. to 1200C are shown to be affected by C, particularly in the quenched condition. An alloy screening program was conducted with W-25% Re, and 1% ThO2 and 1% HfN additions, and with single crystals of W-3.5% Ta-C. The W-Re alloys have superior strength up to 2400C. A yield stress of 47 kpsi was found at 1600C in the quenched W-3.5% Ta-C single crystal. Reactions between ThO2 and W, C, and several carbides were investigated as was the reaction W+TaC. A phase diagram of the W-Ta-C system resulted. (Author)

AD-613 111 Div. 17

Illinois Univ., Urbana.
COMMENTS ON THE DILATION IN THE AUSTENITE-MARTENSITE CONTACT INTERFACE,
by C. M. Wayman. 8 Feb 61. 4p

Contract AF49 638 420
AFOSR 2788
Unclassified report

Pub. in Acta Metallurgica (U. S.) v9 p912-5 1961
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Martensite, Transformations), (*Crystallography, Martensite), Phase studies, Surface properties, Austenite, Theory, Steel, Crystal lattices, Carbon alloys.

AD-613 133 Div. 17

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
OCCURRENCE OF DUCTILE HYDRIDES IN ZIRCALOY-2, by G. W. Parry and W. Evans. 1964, 1p
AECL-2098 Unclassified report

Pub. in Nucleonics (U. S.) v22 n11 Nov 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Zirconium alloys, Hydrides), (*Hydrides, Zirconium alloys), Tin alloys, Ductility, Tensile properties, Zirconium compounds, Plasticity, Fracture (Mechanics), Temperature, Metallography.

An investigation was made of the occurrence of ductile hydrides in Zircaloy-2. The results demonstrate that the tensile properties of hydrided Zircaloy are restored in the range 100-200C due to plasticity of the hydrides. The mechanism is not clear, but the temperature increase may change the generally accepted composition $ZrH_{1.5}$ to a ductile form, or there may exist a complex relationship between the hydride phase and the zirconium matrix.

18. Military Sciences and Operations

AD-612 499 Div. 18, 14, 1, 12
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
NAVAL WEAPONS REQUIREMENTS. AGE CONTROLS OF AGE-SENSITIVE ELASTOMERIC PARTS.
11 Dec 64, 5p Rept. no. WR-64
Unclassified report

Descriptors: (*Elastomers, Degradation), (*Naval equipment, Elastomers), Weapon systems, Storage, Standards, Military requirements, Spare parts, Preservation, Time.

This document establishes requirements for age control of elastomer parts used in aircraft, space vehicles, and missiles, and component assemblies thereof containing elastomeric parts at time of delivery to the Government. Age Control is the designation of a specific maximum period of age after cure date or assembly date that will assure desired conformance characteristics of an elastomeric part. Age control is based on the premise that elastomers deteriorate upon exposure to ozone, oxygen, heat, sunlight, rain, and other similar environmental factors.

AD-612 624 Div. 18, 13

Protective Structures Development Center, Fort Belvoir, Va.
DUAL PURPOSE COMMUNITY FALLOUT SHELTERS, 200 and 1000 PERSONS.
Rept. for Jul 62-Aug 63,
by H. C. Lamb. 15 Oct 64, 64p PSDC-TR-1
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Shelters, Design), Radioactive fallout, Civil defense systems, Civilian personnel, Population, Construction, Lighting equipment, Heaters, Ventilation, Tests, Structural parts, United States.

The report covers the design, construction, cost analysis, preliminary testing and evaluation of the prototype dual purpose 200 and 1000-person community fallout shelters. The building design provides for an excellent dual-purpose shelter. However certain modifications may be made to the design for further improvements in similar structures. No unusual construction problems were encountered. The cost per person sheltered in the 1000-person shelter was approximately $152 compared to $300 in the 200-person shelter. During normal operation and acceptance tests, the heating and ventilating systems of the shelters maintained design conditions. Most electrical features proved to be satisfactory during normal use. Additional investigation of the acoustics of the shelters and methods of reducing noise from mechanical equipment is desirable. (Author)

AD-612 706 Div. 18, 32
CFSTI Prices: HC$4.00 MF$0.75

Institute for Defense Analyses, Arlington, Va. Economic and Political Studies Div.
FEDERAL CIVIL DEFENSE ORGANIZATION: THE RATIONALE OF ITS DEVELOPMENT,
by Robert A. Gessert, Nehemiah Jordan, and John E. Tashjean. Jan 65, 109p Study S-184, IDA/HQ-65-3480 Contract OCD-OS-63-134
Unclassified report

Descriptors: (*Civil defense systems, Management planning), National defense, Defense systems, Communication systems, United States Government, Department of Defense, Shelters, Education, Civil defense personnel, Decision making, Warning systems, Costs, History.

The present study examines the organizational concepts which have emerged during the modern history of civil defense. Since these have derived largely from polity-oriented approaches, concepts of the role of civil defense in national security policy and machinery, of Federal, State, and local responsibilities, and of emergency powers are stressed. The issues underlying these polity problems are considered under three main headings: the mission and purpose of civil defense, the operational requirements for fulfilling the life-saving mission, and the policy constraints which limit the range of feasible ways to meet requirements. Cost/effectiveness analyses are suggested for initial comparisons of the alternative organizational systems for satisfying requirements for protective capabilities, emergency services, resource allocation, and communications systems. Broad organizational proposals which have been recommended are examined, and the principal reasons for which they have been rejected are indicated.

AD-612 739 Div. 18, 1
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
ESTIMATING THE PRODUCTIVITY OF LARGE TRANSPORT AIRCRAFT IN ARMY DEPLOYMENTS: A SIMPLIFIED METHOD,
by William F. Sharpe. Nov 64, 63p RM-4312-PR
Contract AF49 638 700
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Deployment, Army operations), (*Army operations, Deployment), (*Transport planes, Deployment), Effectiveness, Analysis, Simulation, Air transportation.

The basic elements of the method are route analysis and loading simulation. For any specified type of deployment, the results from a limited number of cases can be used to derive tables which, together with an aircraft's payload-range curve, allow the analyst to determine the minimum fleet-size required for a specified task or, alternatively, to determine the magnitude of the task which a fleet of a given size can perform. The results for twenty important cases are presented to illustrate the method and to aid the current process of evaluating alternative designs for the CX-HLS aircraft. Indices of fleet-size for the C-141 aircraft are shown for each case, and tables from which comparable indices can be determined for the CX-HLS are included. Additional data relevant to the comparison of the C-141 and the CX-HLS are also given. The method described, and the data provided for the cases studied, make it possible to estimate the productivity of large transport aircraft in army deployments. In many cases this technique will prove sufficiently accurate for answering the questions at issue, other cases call for actual simulations.

AD-612 895 Div. 18
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.

FAST-VAL: A MODEL FOR FORWARD AIR STRIKE EVALUATION,
by Jack R. Lind. Mar 65, 7p P-3076

Unclassified report

Prepared for presentation at the East Coast War Games Council Symposium, McLean, Va., 25-25 Mar 65.

Descriptors: (*Aerial warfare, Analysis), Game theory, Weapons, Operations research.

FAST-VAL, the Forward Air Strike Evaluation model, is designed to bring together military situations developed through war gaming, and weapon assessment possibilities permitted through the use of computing machinery. FAST-VAL thus permits the extension of gaming from situations in which weapon effects are well known to players to those in which weapon effects must be developed. This paper outlines the rationale used in developing the FAST-VAL model, provides some illustrative assessments, and suggests some potential war gaming applications. Work with the FAST-VAL model indicates that the difficult task of assessing the influence of airpower on ground forces is slowly yielding to analytical methods.

AD-612 921 Div. 18, 15
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
PROBLEMS OF FORCE POSTURE EVALUATION,
Revised ed.,
by David McGarvey. 30 Jan 61, 18p
Rept. no. P-2138

Unclassified report

Presented at the Annual National Meeting of the Operations Research Society of America(18th) Detroit, Michigan, October 10, 1960.
Revision of rept dated 15 Oct 1960.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Warfare, Game theory), (*Game theory, Warfare), Mathematical models, Decision theory, Strategic warfare, Weapon systems, Casualties, Radioactive fallout.

Methods of computation and reporting of results are utilized which provide the decision maker or evaluater with synthetic experience in central war. By emphasizing flexible methods which lend themselves to quick computation, the user can ask questions of the model, test out particular hypotheses or doctrines that seem important, and explore the effects of unpredictables. In order that the user will understand the 'why' of the computations and have an understanding of the significance of the assumptions and results, transparent computational methods were emphasized. When necessary, the aggregated calculations were backed up by more detailed computation of some facets (selective focusing). It is claimed that the resultant model and its utilization do not mislead. It was useful in developing an understanding of the over-all implications of various strategic doctrines and force posture decisions. (Author)

AD-612 963 Div. 18, 26
CFSTI Prices: HC$1.00 MF$0.50

Electronics Research Labs., Columbia Univ., New York.
COST GUIDELINES FOR STUDY CONTRACTORS,
by C. Walsh. 6 Oct 64, 17p
Technical rept. no. T-1/306, CU-44-64-AF-1113-ERL
Contract AF49 638 1113, ARPA Order 279

Unclassified report

Descriptors: (*Costs, Air force procurement), (*Defense systems, Costs), Systems engineering, Management planning, Manpower studies, Time studies, Maintenance, Deployment, Personnel, Training, Optimization, Reliability, Effectiveness.

The object of the present study is to weigh the technical system potential against economic resources in terms of effectiveness per dollar spent. The number and types of systems considered by the various contractors will be substantial. Cost guidelines are thus required to insure that the economic resources are equally measured in all cases. Since the study results will form part of the basis of executive decisions the reported costs should be based on the experience and judgment of the participating contractors, rather than developed from arbitrary rules. The guidelines indicate the areas of substantial interest and seek to elicit supporting data to permit the proper evaluation of the stated costs.

19. Navigation

AD-612 610 Div. 19, 1
CFSTI Prices: HC$3.00 MF$0.75

Bendix-Pacific Div., Bendix Corp., North Hollywood, Calif.
HELICOPTER RADAR NAVIGATION SYSTEM AND ENHANCEMENT DEVICES.
Final rept. for 1 Mar 62-Sep 64,
by M. L. Palmquist. Sep 64, 90p
Contract ARDS510, Proj. 320 103 02N
SRDS RD-64-125

Unclassified report

Descriptors: (*Helicopters, Radar navigation), (*Radar navigation, Helicopters), (*Navigational aids, Radar equipment), (*Flight instruments, Radar equipment), Plan position indicators, Aeronautics, Ground support equipment, Systems engineering, Superhigh frequency.

The radar system developed for this program operates in the 15.4 to 15.7 gc navigation band, and uses a slotted array antenna to form an approximate cosecant squared pattern. The direct-view storage display unit provides a bright PPI display, with range representations of 1.5, 5.0, and 15.0 miles. Information renewal rotation speed is 30 rpm; pulse length is 0.22 microseconds and beam width is two degrees. Selection of video types is incorporated to enable evaluation of the FTC, video processor, and displaying beacons. The scope of the program was expanded to include three compatible ground-based beacons, and three passive enhancement devices. (Author)

AD-612 882 Div. 19, 5
CFSTI Prices: HC$1.00 MF$0.50

Systems Research and Development Service, Federal Aviation Agency, Washington, D. C.
REMOTE CONTROL AIR GROUND FACILITY MONITORING.
Final rept.,
by Raymond R. Barkalow. Feb 65, 22p
Rept. no. RD-65-19
Proj. 113 005

Unclassified report

Descriptors: (*Air traffic control systems, Remote

control systems), (*Communication equipment, Monitors), Voice communication systems, Very high frequency, Ultrahigh frequency, Telephone lines.

The requirements of a fully effective RCAG monitor are discussed and a description of a Systems Research and Development Service developed monitor meeting these requirements is described. Also described is a simple line monitor which is being provided by the American Telephone and Telegraph Company. A cost benefit analysis shows that over 75% of the total RCAG outages is attributable to the line and that monitoring only the lines will result in a savings of approximately $61,000 annually in travel expenses. The analysis also shows that no savings can be effected by monitoring equipment at the RCAG and that to provide an effective RCAG monitor for operational purposes would be economically prohibitive. (Author)

AD-612 898 Div. 19, 30, 33
CFSTI Prices: HC$6.00 MF$1.50

TRW Computers Co., Canoga Park, Calif.

AIR TRAFFIC CONTROL STUDIES. TERMINAL AREA SEQUENCING AND CONTROL.
Rept. no. 10 (final) 1 Jan 60-28 Feb 61,
by A. S. Jackson, H. I. Ottoson, R. S. Pardee, L. E. Nall, and F. C. Holland. Feb 61, 253p
Contract FAA BRD112
PB 159 977

Unclassified report

Rept. on project TASC.

Descriptors: (*Air traffic control terminal areas, Simulation), Real time, Flight simulators, Computers, Display systems, Approach, Landings, Control sequences, Human engineering, Systems engineering, All-weather aviation, Aviation safety.

The major areas of coverage are: (1) philosophy and aims of real-time simulation in the terminal area, (2) equipment available for real-time simulation, (3) brief description of the systems that have been simulated, and (4) results obtained from real-time simulation and theoretical studies.

20. Nuclear Physics and Nuclear Chemistry

AD-612 463 Div. 20, 6, 14
CFSTI Prices: HC$1.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
NUCLEAR RADIATION EFFECTS ON INFRARED MATERIALS AND COMPONENTS, PART I. EFFECTS OF GAMMA RADIATION ON INFRARED TRANSMITTING MATERIALS AND FILTERS,
by Clyde C. Shaw and R. S. Krogstad. 16 Jun 58, 25p LMSD-5014

Unclassified report

See also AD-612 464.

Descriptors: (*Infrared optical materials, Radiation damage), (*Infrared filters, Radiation damage), (*Radiation damage, Infrared equipment), Glass, Quartz, Oxides, Magnesium compounds, Sapphire, Silicon, Crystals, Gamma rays, Infrared radiation, Wave transmission.

Results of a survey of cobalt-60 gamma radiation effects on the optical properties of a number of infrared transmitting materials and filters are presented. This study shows that, with few exceptions, the materials and filters are insensitive to gamma radiation at a dosage level of 10 to the 7 power roentgens or more. (Author)

AD-612 464 Div. 20, 6
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
NUCLEAR RADIATION EFFECTS ON INFRARED MATERIALS AND COMPONENTS, PART II. EFFECT OF GAMMA RADIATION ON LEAD SULFIDE INFRARED DETECTORS,
by F. A. Junga and R. S. Krogstad. 23 Jun 58, 27p LMSD-5029

Unclassified report

See also AD-612 463.

Descriptors: (*Infrared detectors, Radiation damage), (*Radiation damage, Infrared detectors), Lead compounds, Sulfides, Photoconductivity, Gamma rays, Films.

Results of a study of cobalt-60 gamma radiation effects on the photoconductive properties of lead sulfide infrared detectors are presented. This investigation shows that detector performance begins to deteriorate almost immediately upon exposure to radiation. After a total gamma dose of 10 to the 7 power roentgens the sensitivity is reduced to about 20% of its initial value. (Author)

AD-612 508 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

Naval Research Lab., Washington, D. C.
DETERMINATION OF THE SPIN AND PARITY OF NUCLEAR EXCITED STATES BY THE EXPERIMENTAL MEASUREMENT OF TRIPLE CORRELATIONS IN (p, GAMMA-GAMMA) REACTIONS.
Final rept., phase 1,
by C. R. Gossett and L. S. August. 12 Feb 65, 95p
Rept. no. NRL-6186
Proj. RR002 06 41 5006 Unclassified report

Descriptors: (*Nuclear spins, Determination), (*Parity, Determination), (*Gamma-proton reactions, Nuclear properties), Nuclear spectroscopy, Nuclear models, Proton capture, Gamma emission, Coincidence counting, Correlation techniques, Nuclear energy levels, Proton beams, Nickel, Copper.

The measurement of triple correlations in (p, gamma-gamma) reactions to determine spin and parity of nuclear excited states has not been widely used in the past, despite the capability of such measurements to produce generally unambiguous assignments, because of the low efficiency, the complexity, and the difficulty of such measurements when performed by standard techniques. An experimental arrangement is described which allows the measurement of triple correlations with an exceptionally high efficiency and multiplicity (the capability of measuring many different correlations simultaneously). This improvement has been obtained primarily from the successful application of a three-crystal double sum-coincidence spectrometer. An explanation of the method and detailed descriptions of the physical apparatus, electronic circuitry, experimental procedures, and data analysis are given. The results of an extensive triple correlation experiment on the 60Ni)(p, gamma-gamma)61 Cu reaction are presented with the conclusions regarding the spin and probable parity of six of the lowest-lying energy levels and a discussion of the applicability of certain nuclear models to this nucleus. (Author)

AD-612 522 Div. 20, 25

Yale Univ., New Haven, Conn.
HYPERFINE STRUCTURE OF MUONIUM,
by K. Ziock, V. W. Hughes, R. Prepost, J. Bailey, and W. Cleland. 5 Jan 62, 3p
Contract AF49 638 545
AFOSR 2791

Unclassified report

Pub. in Physical Review Letters (U. S.) v8 n3 p103-5 Feb 1 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Muons, Hyperfine structure), (*Hyperfine structure, Muons), Quantum mechanics, Microwave spectroscopy, Magnetic fields, Power series.

AD-612 523 Div. 20, 2

California Inst. of Tech., Pasadena.
NEUTRINO OPACITY I. NEUTRINO-LEPTON SCATTERING,
by John N. Bahcall. 24 Jun 64, 8p
Contract Nonr22047; Grant NASA NGR05 002 028

Unclassified report

Pub. in Physical Review (U. S.) v136 n4B pB1164-71 Nov 23 1964 copies not available to DDC or Clearinghouse customers). See also AD-612 434.

Descriptors: (*Neutrinos, Leptons), (*Scattering, Neutrinos), (*Leptons, Scattering), (*Astrophysics, Neutrinos), Antiparticles, Energy, Electrons, Gases, Muons, Absorption, Fourier analysis, Supernovae, Differential cross section, Resonance scattering.

The contribution of neutrino-lepton scattering to the total neutrino opacity of matter is investigated, it is found that, contrary to previous beliefs, neutrino scattering dominates the neutrino opacity for many astrophysically important conditions. The rates for neutrino-electron scattering and antineutrino-electron scattering are given for a variety of conditions, including both degenerate and nondegenerate gases, the rates for some related reactions

are also presented. Formulas are given for the mean scattering angle and the mean energy loss in neutrino and antineutrino scattering. Applications are made to the following problems: (a) the detection of solar neutrinos; (b) the escape of neutrinos from stars; (c) neutrino scattering in cosmology; and (d) energy deposition in supernova explosions. (Author)

AD-612 524 Div. 20, 2, 25

California Inst. of Tech., Pasadena.
ENERGY LEVELS IN K37 AND Ar37, AND BETA DECAY OF K37,
by R. W. Kavanagh and D. R. Goosman. 20 Aug 64, 5p
Contract Nonr22047

Unclassified report

Pub. in Physics Letters (Netherlands) v12 n3 p229-33 Oct 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear energy levels, Nuclear isobars), (*Beta decay, Potassium), (*Nuclear isobars, Nuclear energy levels), Nuclear spectroscopy, Nuclear shell models, Proton bombardment, Annihilation radiation, Gamma-ray spectra, Bremsstrahlung, Argon, Calcium, Neutrinos, Solar radiation.

AD-612 529 Div. 20

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
HYPERFINE STRUCTURE OF Hg193*, Hg195, AND Hg195* BY ZEEMAN-LEVEL CROSSINGS.
Revised ed.,
by Winthrop W. Smith. 24 Aug 64, 10p
Contract DA36 039AMC03200E

Unclassified report

Pub. in Physical Review (U. S.) v137 n2A pA330-39 Jan 1965 (Copies not available to DDC or Clearinghouse customers)
Revision of rept. dated 6 Apr 64.

Descriptors: (*Hyperfine structure, Mercury), (*Mercury, Nuclear energy levels), (*Nucelar energy levels, Mercury), Nuclear isomers, Isotopes, Nuclear magnetic moments, Nuclear shell models, Radioactivity, Nuclear resonance, Protons, Magnetic fields.

Hyperfine-structure measurements by optical detection of Zeeman-level crossings in the 6s6p3P1 state were made with natural-linewidth precision in three radioactive isotopes of mercury. The magnetic dipole (A) and electric quadrupole (B) interaction constants in Mc/sec implied by these measurements (without second-order hyperfine corrections, but including second-order Zeeman and cross-Zeeman hyperfine corrections) are: Hg195 (9.5-h half-life A(3P1)=15813.46±0.23, Hg195* (isomer, 40h) A(3P1)=-2368.04±0.08, B(3P1)=-782.45±0.86, Hg193* (isomer, 11 h) A(3P1)=-2399.69±0.06, B(3P1)=-724.8±90.0. The g sub J factor for the 3P1 state of Hg199 is obtained from a new level-crossing measurement. Our value is in substantial agreement with a recent measurement in the even Hg isotopes. The measured ratio of the A factors of Hg195 and Hg199 with all second-order corrections (resulting from interaction with neighboring fine-structure levels) included is combined with the value for the ratio of the magnetic moments in an external field obtained by Walter and Stavn to yield the Bohr-Weisskopf hfs anomaly between Hg195 and Hg199, which is calculated to be 195 delta 199 (3P1)=0.1476(76)%. The contribution to the anomaly from the S1/2 electron is extracted and used to estimate admixture coefficients in the single-particle model of the nucleus with configuration mixing. These turn out to be satisfactorily small for the configurations assumed. (Author)

AD-612 559 Div. 20

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
RESONANCE SCATTERING OF 4.4-MeV GAMMA RAYS BY Na23 AND Al27,
by F. R. Metzger. 1963, 3p

Unclassified report

Pub. in Congress International de Physique Nucleaire, Paris, 1964. Comptes Rendus, v2 Communications p392-3(Copies available only to DDC users).

Descriptors: (*Resonance scattering, Gamma-ray scattering), (*Gamma-ray scattering, Resonance scattering), Sodium, Aluminum.

AD-612 571 Div. 20, 15

Illinois Univ., Urbana.
PION-NUCLEON VERTEX FUNCTIONS,
by Masakuni Ida. 3 Aug 64, 10p

Unclassified report

Pub. in Physical Review (U. S.) v136 n6B pB1767-76 Dec 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pions, Nucleons), (*Nucleons, Pions), (*Special Functions (Mathematical), Nuclear shell models), S-matrix, Inequalities, Integrals, Nuclear resonance.

A quantitative study of the pion-nucleon vertex function with one nucleon off the mass shell is presented using dispersion-theoretical techniques. The discussion is based on the unitarity conditions for the vertex function and for the one-nucleon irreducible parts of the pion-nucleon scattering amplitudes with I = J = 1/2. It is shown in terms of the N/D method that the vertex function has a sharp maximum in the low-energy region. Its existence is found to be crucial for a certain inequality, which is due to the requirement of no ghosts in the theory, to be satisfied. The nucleon propagator is strongly suppressed at the energy of this maximum. Reasonable results obtained seem to suggest that ghosts are not present in pion physics, although the present calculation is still incomplete. The pion-nucleon vertex function with pion off the mass shell is also discussed and some early attempts are re-examined. The importance of a pole or a resonance-like behavior in this vertex is suggested. (Author)

AD-612 575 Div. 20

Arkansas Univ., Fayetteville.
ISOTOPE SHIFTS IN PALLADIUM,
by R. H. Hughes and F. A. Sharpton. 14 Nov 60, 2p
Contract AF49 638 547
AFOSR 3549

Unclassified report

Pub. in Physical Review (U. S.) v121 n6 p1702-3 Mar 15 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Isotopes, Palladium), (*Palladium, Isotopes), Isotope impurities, Nuclear spectroscopy.

Isotope shifts in the 4d(9)5s 1D2-4d(9)5p 3F3 transition at 4212 A in the first spectrum of Pd has

been studied with the use of enriched isotopes. The shifts are similar to those found by Kuhn and Warner in the 4d(9)5s 3D3-4d(9)5p 3F4 transition at 3405 A. The most interesting feature is the maximum in the isotope shift which appears at the neutron number pair 60-58. (Author)

AD-612 677 Div. 20, 25
CFSTI Prices: HC$3.00 MF$0.75

Atomics International, Canoga Park, Calif.
SUPERCONDUCTING NUCLEAR PARTICLE DETECTOR.
Interim rept. for 25 Mar 64-15 Feb 65,
by D. E. Spiel and R. W. Boom. 15 Feb 65, 62p
AI-65-36
Contract DA18 035AMC107A
Unclassified report

See also AD-603 666.

Descriptors: (*Radiation measurement systems, Superconductors), (*Superconductors, Radiation measurement systems), Alpha particle detectors, Films, Tin, Electrons, Excitation, Cryogenics, Alpha bombardment.

A summary is presented of the work conducted, and the techniques employed, during the period March 25, 1964, through February 15, 1965, in which the application of superconducting thin films to nuclear particle detection was investigated. The main result of this work is that superconducting nuclear particle detectors are feasible. Self-recovering, alpha-particle induced pulses of nanosec duration have been observed on a variety of tin films which had widths ranging from 10 to 50 microns. Considerable progress has been made in understanding these and other observations by the development of a theory which is in good quantitative agreement with the experimental results.

AD-612 836 Div. 20, 25

High-Energy Physics Lab., Stanford Univ., Calif.
NEUTRAL MESON PRODUCTION WITH POLARIZED X RAYS,
by Darrell J. Drickey and Robert F. Mozley.
8 Jun 64, 15p Rept. no. HEPL-296
Contract Nonr22567, Proj. NR022 026
Unclassified report

Pub. in Physical Review (U. S.) v136 n2B pB543-57 Oct 26 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pions, Photonuclear reactions), (*Photonuclear reactions, Pair production), (*Meson reactions, Pair production), (*Bremsstrahlung, Meson reactions), X rays, Photons, Polarization, Nuclear resonance.

Measurements of neutral pion photoproduction have been made at 235, 285, 335, and 435 MeV, using a beam of polarized x rays. Using a calculated value of polarization, an analysis is made which indicates a possible need for gamma, rho, pi, or gamma, omega, pi coupling. The polarization calculations are checked by measurements made as a function of photon production angle at 335 MeV. (Author)

AD-612 837 Div. 20, 25

High-Energy Physics Lab., Stanford Univ., Calif.
CHARGED-PION PHOTOPRODUCTION FROM DEUTERIUM WITH POLARIZED BREMSSTRAHLUNG,
by F. F. Liu, D. J. Drickey, and R. F. Mozley.
13 Jul 64, 4p Rept. no. HEPL-330
Contract Nonr22567, Proj. NR022 026
Unclassified report

Pub. in Physical Review (U. S.) v136 n4B pB1183-6 Nov 23 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pions, Photonuclear reactions), (*Photonuclear reactions, Pair production), (*Meson reactions, Pair production), (*Bremsstrahlung, Meson reactions), X-rays, Polarization, Photons, Deuterium, Nuclear cross sections, Momentum.

Measurements were made on the ratio of pion-production cross sections at right angles to and along the photon electric-field vector. The positive and negative pions were first momentum-analyzed and counted by means of a counter telescope. Data were taken at 45, 90, and 135 degrees in the c.m. system, and at proton energies of 225, 330, and 450 MeV. A comparison of the data is made with the dispersion-relation calculation of McKinley. (Author)

AD-612 914 Div. 20
CFSTI Prices: HC$1.00 MF$0.50

Cyclotron Lab., Harvard Univ., Cambridge, Mass.
RESEARCH IN NUCLEAR PHYSICS.
Quarterly progress rept. for 1 Dec 64- 28 Feb 65.
1965, 11p
Contract Nonr186619
Unclassified report

Descriptors: (*Nuclear physics, Scientific research), Reports, Protons, Bremsstrahlung, Cyclotrons, Nuclear scattering, Proton scattering, Silicon, Potassium, Nectron cross sections, Carbon, Hydrogen, Helium, Nitrogen, Water, Heavy water, Neutron beams, Radiobiology, Whole body irradiation, Nuclear spectroscopy, X-rays, Lasers.

Reports are presented on research in the following areas: quasi-elastic proton-proton scattering, proton-proton bremsstrahlung, neutron total cross sections, monokenetic neutron beam, n-pincoherent scattering cross section, radiobiology, whole-body proton exposure, and nuclear magnetism and nuclear spectroscopy.

AD-612 974 Div. 20

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
ISOBARIC ANALOGUE STATES AND THE SHELL MODEL,
by W. T. Pinkston. 10 Dec 63, 7p
Unclassified report

Pub. in Nuclear Physics (Netherlands) v53 p643-9 1964 (Copies available only to DDC users). Research supported by the Office of Naval Research, Washington, D. C.

Descriptors: (*Nuclear isobars, Nuclear shell models), (*Nuclear shell models, Nuclear isobars), Nuclear energy levels, Nuclear structure, Quantum mechanics, Nucleons, Hamiltonian.

It is pointed out that the calculation of the energy of the isobaric analogue state using the nuclear shell model provides a test of the consistency of the two-body interaction used and the empirical single-body energies. It is suggested that such calculations would provide informa-

tion on the effective two-body interaction in nuclear matter. The model of Ikeda, Fujii and Fujita is used to illustrate these ideas and is generalized to include neutron pairing correlations. (Author)

AD-612 975 Div. 20

Sydney Univ. (Australia).
A COMPARISON OF PION AND NUCLEAR INTERACTIONS IN EMULSION AT ENERGIES BETWEEN 100 AND 10,000 bev. III-6-9,
by F. A. Brisbout, C. Gauld, C. B. A. McCusker, J. Malos, and K. Nishikawa. 1962, 2p
Contract AF49 638 842
AFOSR 3166

Unclassified report

Pub. in Physical Society of Japan. Journal v17 suppl. A-III p403-4 1962 (Copies available only to DDC users). Rept. a part of the suppl. on the International Conference on Cosmic Rays and the Earth Storm, Part III.

Descriptors: (*Pions, Nuclear reactions), (*Nuclear reactions, Pions), Photographic emulsion, Cosmic rays, Nucleons, Cosmic ray bursts.

AD-612 988 Div. 20

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
LIFETIMES OF THE LOW-LYING LEVELS OF 20Ne,
by H. C. Evans, M. A. Eswaran, H. E. Gove, A. E. Litherland, and C. Broude. 14 Oct 64, 15p
AECL-2126

Unclassified report

Pub. in Canadian Journal of Physics v43 p82-95 Jan 1965 (Copies available only to DDC users).

Descriptors: (*Nuclear energy levels, Neon), (*Neon, Nuclear energy levels), Half life, Doppler effect, Nuclear models, Alpha particle reactions, Gamma-ray spectra, Decay schemes, Selection rules, Particle accelerator techniques, Nuclear structure, Digital computers, Canada.

The lifetimes of the 1.63-, 4.25-, 4.97-, and 5.63-MeV levels in Ne 20 have been measured by the Doppler shift attenuation method. The lifetimes in picoseconds are 1.23±0.12, 0.134±0.012, 4.8+1.7 or - 1.1, and 0.35±0.075 respectively. The reduced widths in Weisskopf units for the 1.63-, 2.62-, 3.34-, and 4.00-MeV gamma-ray transitions, together with the gamma-ray multipolarities, are 17.6+1.9 or -1.5 (E2), 15.1+1.5 or -1.2 (E2), 7.4+2.1 or -1.9 x 0.000001 (E1), and 4.7+1.3 or -0.8 x 0.000001 (E1). (Author)

AD-612 989 Div. 20

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
PRECISION MEASUREMENT OF THE MOMENTA OF CONVERSION ELECTRON LINES FROM SOURCES OF 212Pb (ThB),
by R. L. Graham, G. Murray, and J. S. Geiger.
26 Oct 64, 22p AECL-2128

Unclassified report

Pub. in Canadian Journal of Physics v43 p171-92 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Internal conversion, Momentum), (*Lead, Internal conversion), Electron transitions, Beta-ray spectroscopy, Thorium, Mercury, Gamma emission, Nuclear radiation spectrometers, Canada.

Momentum ratios of some of the more intense internal conversion lines from sources of thorium radioactive deposit have been determined with accuracies of 1 to 4 parts in 100,000 using an iron-free beta spectrometer. Accurate absolute values of the momenta were obtained from intercomparisons of these line momenta with that of the K-412 internal conversion line in 198Hg. The X-ray self-calibration method of Siegbahn is discussed in some detail and is shown to be less accurate at this time. The results are analyzed on both the 1955 and 1963 least-squares adjusted values of the fundamental constants. (Author)

AD-612 990 Div. 20

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
PENETRATION EFFECTS IN THE K AND L INTERNAL CONVERSION COEFFICIENTS OF THE 279 keV TRANSITION IN T1203,
by C. J. Herrlander and R. L. Graham. 9 Apr 64, 17p AECL-1981

Unclassified report

Pub. in Nuclear Physics (Netherlands) v58 p544-60 1964 (Copies available only to DDC users).

Descriptors: (*Internal conversion, Thallium), (*Thallium, Internal conversion), Nuclear energy levels, Nuclear binding energy, Penetration, Electron transitions, Gamma emission, Selection rules, Decay schemes, Beta-ray spectroscopy, Nuclear radiation spectrometers.

Conversion lines of the 279.16±0.02 and 401.27±0.05 keV transitions in T1203 have been studied at high resolution (≈0.07% in momentum). From the measured line intensities and the known total conversion coefficient (0.2262±0.0019) measured by Taylor the following conversion coefficients are deduced for the 279 keV M1+E2 transition: alpha K = 0.163±0.003, alpha LI = 0.0245± 0.0004, alpha LII = 0.0162±0.0003, alpha LIII = 0.0077± 0.0003, alpha M = 0.0118±0.0003, alpha N+0 = 0.0035+ 0.0002. The measured L conversion ratios of the 401 keV transition show that it is pure M1 with <2%E2, in accordance with earlier results. In order to test the accuracy of E2 theoretical L conversion coefficients, precise experimental line intensity ratios are reported for five pure E2 transitions in the region 76 or = Z or = 80. The trend of these ratios when compared with theory indicates that the true LII and L III coefficients may be a few percent lower than Sliv's theoretical predictions. The experiments were performed in order to study the nuclear structure effect on the internal conversion of the M1 part of the 1 forbidden 279 keV transition. The significance of the K and L conversion coefficients is discussed in detail. The effects of possible uncertainties in the present theoretical predictions are also considered and show that a solution with the penetration parameter V = 73 cannot be conclusively rejected although with present knowledge it seems unlikely.

AD-612 991 Div. 20

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
A KRYPTON-81 HALF-LIFE DETERMINATION USING A MASS SEPARATOR,
by T. A. Eastwood, F. Brown, and I. H. Crocker.
19 Mar 64, 9p AECL-1969

Unclassified report

Pub. in Nuclear Physics (Netherlands) v58 p328-36 1964 (Copies available only to DDC users).

Descriptors: (*Half life, Krypton), (*Krypton, Half life), Mass spectroscopy, Electron capture, Isotope separation.

The half-life of 81Kr was determined with aid of a mass separator equipped with a current integrator. In each experiment a natural krypton sample was irradiated with neutrons to produce 81Kr. After determining the 81-82 atom ratio with a conventional mass spectrometer, the sample was processed in the mass separator, the mass 81 beam being collected in aluminium foil while the mass 82 fraction was collected simultaneously in the Faraday cup of the current integrator. The number of atoms of 81Kr collected in the aluminium foil was calculated from the 81-82 atom ratio and the integrated current of 82Kr. The disintegration rate of these atoms was determined by counting the bromine K X-rays produced in the electron-capture decay of 81Kr using a NaI scintillation spectrometer and thus the half-life was deduced. Tests using natural krypton mixed with 11 y 85Kr showed that ± 3% accuracy can be achieved with the current integrator. The average of six determinations of the half-life was 213,000 y with an estimated experimental error ± 5%. However, when the uncertainty in the 81r decay energy (250±90keV) was included the error was increased, giving T1/2(81Kr) = (213,000±16,000 or-26,000)y, a value that agrees with the only previous measurement and is more accurate. (Author)

AD-612 993 Div. 20, 8, 30

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
MEASUREMENT OF THE ION FLUX EMANATING FROM OXIDE COATED EMISSION FILAMENTS IN A SIEMENS ELECTRON MICROSCOPE,
by J. R. Parsons and L. M. Howe. 24 Jul 64, 3p AECL-2092
Unclassified report

Pub. in Journal of Scientific Instruments (Gt. Brit.) v41 p773-5 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Ion bombardment, Radiation damage), (*Radiation damage, Foils), (*Electron microscopes, Ion bombardment), Germanium, Ion sources, Filaments, Oxides, Coatings, Ion beams.

A Faraday cage, inserted into a Siemens Elmiskop I and used in conjunction with in-microscope radiation damage experiments, is described. It is positioned and the microscope is operated so that it can discriminate and hence separately measure either the oxygen ion or the electron flux simultaneously emitted from oxide-coated filaments. (Author)

AD-612 994 Div. 20, 25

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
THERMAL NEUTRON SPECTRA NEAR ABSORBERS. Revised ed.,
by C. B. Bigham. 4 Aug 64, 8p AECL-2103
Unclassified report

Pub. in Nuclear Science and Engineering (U. S.) v21 p106-13 1965 (Copies available only to DDC users) Revision of rept. dated 19 Feb 64.

Descriptors: (*Thermal neutrons, Neutron spectrum), (*Neutron spectrum, Neutron absorbers), Reactor moderators, Perturbation theory, Graphite, Boron, Cadmium, Acrylic resins.

The perturbation in a thermal neutron spectrum near an absorber immersed in a moderator has been studied using activation techniques. The results show two separate effects for pure thermal spectra, a 'transmission hardening' depending on the energy variation of the absorber cross section and a 'boundary effect' depending on the energy variation of the moderator scattering cross section. These results are in agreement with energy-dependent Milne problem calculations for a mass one, free-gas moderator and with another experimental result when a third 'source hardening' effect in reactor spectra is considered. (Author)

AD-612 995 Div. 20

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
ELASTIC SCATTERING OF ALPHA PARTICLES BY OXYGEN FOR INCIDENT ENERGIES BETWEEN 7.2 AND 8.5 MeV,
by G. J. McCallum and A. J. Ferguson. 16 Oct 64, 11p AECL-2129
Unclassified report

Pub. in Canadian Journal of Physics v43 p111-21 Jan 1965 (Copies available only to DDC users).

Descriptors: (*Alpha particles, Elastic scattering), (*Elastic scattering, Alpha particles), (*Oxygen, Elastic scattering), Carbon, Resonance scattering, Nuclear spins, Parity, Alpha bombardment, Particle accelerator techniques, Canada.

Angular distributions of alpha particles elastically scattered by 16O, obtained at 12 energies between 7.4 and 8.5 MeV, are presented together with the yield of scattered alpha particles measured by fixing the detectors at a given angle and varying the energy of the incident particles. Four such excitation curves in the energy range 7.2-8.4 MeV are presented. Resonances are observed at energies 7.32, 7.66, 7.89, and 8.28 MeV. Tentative spin and parity assignments of 4+ and 2+ are obtained for the 7.89- and 8.28-MeV resonances. (Author)

AD-612 996 Div. 20, 25, 30

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
RECENT DEVELOPMENTS IN LI-DRIFTED DETECTORS,
by I. L. Fowler. 1965, 6p AECL-2151
Unclassified report

Pub. in Canadian Nuclear Technology p1-5 1965 (Copies available only to DDC users).

Descriptors: (*Gamma-ray spectroscopy, Semiconductor devices), (*Nuclear radiation spectrometers, Semiconductor devices), (*Semiconductor devices, Nuclear radiation spectrometers), Germanium, Lithium, Diodes (Semiconductor), Gamma rays, Absorption, Photoelectric effect (Gamma rays), Compton scattering, Ionization.

The article emphasizes the most recent developments in the application of semiconductor detectors to gamma ray spectroscopy. Detector development is being continued in Canada and other countries.

AD-613 008 Div. 20
CFSTI Prices: HC$6.00 MF$1.50

Naval Research Lab., Washington, D. C.
GROUP THEORETIC MODEL INTERACTIONS AS AN APPROACH TO 2s-1d SHELL NUCLEI. THE LEVEL STRUCTURE OF FLUORINE-20.
Doctoral thesis,
by Manuel de Llano, Jr. 10 Mar 65, 248p
Rept. no. NRL-6256
Projs. RR002 10 45 5054; ARPA Order 306 62
Unclassified report

Descriptors: (*Fluorine, Nuclear energy levels), (*Nuclear energy levels, Fluorine), (*Nuclear shell models, N-body problem), Nuclear structure, Groups (Mathematics), Hamiltonian, Quantum mechanics.

Based on the studies of S. Lie and E. Cartan in the theory of continuous groups of transformations, M. Moshinsky has reformulated the nuclear shell many-body problem in second-quantization language. The methods due to J.P. Elliott for simplifying the basis set of state functions by classification according to the group SU(3) are recast into the above-mentioned reformulation. The purpose is to make low-energy nuclear calculations feasible for nuclei with 4 and more particles in the 2s-1d shell and thus render the possibility of probing for SU(3) symmetries in these nuclei. A hamiltonian model consisting of pairing and quadrupole-quadrupole terms is known to approximate respectively the short- and long-ranged correlations between nucleons given by an arbitrary, reasonably shaped two-nucleon central interaction potential. The former model is generalized to include exchange effects at the long range as well as spin-orbit coupling, and is studied in detail from the viewpoint of its various group symmetries. It is then employed to calculate the low-lying levels of Fluorine-20 which show reasonable accord with the empirical level-scheme. (Author)

AD-613 053 Div. 20, 17
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
IN-REACTOR FATIGUE TESTS OF A302-B STEEL REPRESENTING THE ELK RIVER REACTOR PRESSURE VESSEL,
by J. R. Hawthorne and L. E. Steele. 15 Feb 65, 18p Memo. rept. no. NRL-MR-1596

Unclassified report

Investigations supported by Chicago Operations Office, Atomic Energy Commission, Ill., Contract AT11 1 1369.

Descriptors: (*Steel, Radiation damage), (*Fatigue (Mechanics), Steel), (*Reactor materials, Steel), Metal plates, Experimental data, Strain (Mechanics), Environmental tests.

Dynamic low cycle fatigue tests of specimens from a 3-inch thick A302-B plate representative of the Elk River Reactor (ERR) pressure vessel have been performed in-reactor at 550F. The test apparatus provided for the simultaneous testing of fifteen sheet-type specimens, representing five average strain amplitudes, in reverse bending. The total neutron dosage received by individual specimens at failure ranged from 7.6 to 8.8 x 10 to the 18th power n/sq cm (>1 Mev), as determined from iron and titanium dosimeter wires included in the experiment. The comparison of data derived from in-reactor tests and out-of-reactor control tests performed on duplicate equipment did not reveal an effect of irradiation on fatigue properties. (Author)

AD-613 090 Div. 20, 25

Columbia Radiation Lab., New York.
QUADRUPOLE MOMENTS OF ODD-NEUTRON NUCLEI; SPIN AND MOMENTS OF 14-YEAR Cd(113m),
by F. W. Byron, Jr., M. N. McDermott, R. Novick, B. W. Perry, and E. B. Salman. 14 Aug 64, 7p
Technical rept. no. TR-18
Contract Nonr26645, Proj. NR014 302

Unclassified report

Pub. in Physical Review (U. S.) v136 n6B pB1654-61 Dec 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cadmium, Quadrupole moments), (*Nuclei, Quadrupole moments), (*Nuclear spins, Cadmium), (*Quadrupole moments, Cadmium), Neutrons, Nuclear moments, Nuclear models.

The nuclear spin and hfs in the (5s5p)(3) P1 state of 14-year Cd(113m) were measured by the optical double-resonance technique. The isotope was produced by the reaction Cd(112) (n, gamma) Cd(113m). After irradiation, the Cd(113m) was separated from the Cd(112) with an electromagnetic mass separator. The nuclear spin I, and the hfs separations are: I = 11/2; nu(13/2-11/2) = 4310.572(5) Mc/sec; nu(11/2-9/2) =3949.625(7) Mc/sec. The hfs coupling constants, corrected to second order for interaction with the (3)P2 and (3)P0 states, are: A(113m) = -686.0425(8) Mc/sec; B(113m) = + 169.047(9) Mc/sec. If we neglect nuclear structure and quadrupole shielding effects, the nuclear moments are: mu(113m) = - 1.08885(13) muN; Q(113m) = -0.79(10) b. The ratio of the Cd(113m) and Cd(109) quadrupole moments is Q(113m)/Q(109) = -1.02371(4); this result is independent of the shielding corrections. The spin and magnetic moment are consistent with a (2d5/2)(6) (1g7/2)(8) (1h11/2)(1) neutron assignment with some configuration mixing. We compare the observed quadrupole moments in cadmium and other spherical odd-neutron nuclei (A < 150, 189 < A < 210) with predictions of the shell model, including configuration mixing, and with the quasiparticle model of Kisslinger and Sorensen. In addition, we show that the semiempirical formula Q = -((2j + 1 - 2N)/(2j + 2))Q0(Z) accurately predicts the quadrupole-moment ratios for the isotopes of several elements. We find that Q0(Z) exhibits strongly oscillatory dependence on the nuclear charge Z with minima near the magic proton numbers. (Author)

AD-613 120 Div. 20

Stanford Univ., Calif.
SEARCH FOR RESONANCES IN THE REACTION Li7(He3, alpha)Li6,
by P. Paul, S. L. Blatt, and D. Kohler. 11 Sep 64, 3p
Contracts Nonr225 19, Nonr225 75

Unclassified report

Pub. in Physical Review (U. S.) v137 n3B pB499-501 8 Feb 65 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Alpha decay, Nuclear resonance), (*Nuclear resonance, Alpha decay), Lithium, Nuclear energy levels, Nuclear spins, Parity, Selection rules, Alpha cross sections.

Angular distributions and cross sections for the reaction Li7(He3, alpha)Li6 leading to the ground state and the first two excited states of Li6 have been measured in the energy range 0.8 to 3.0 MeV. The data are discussed with regard to resonances previously observed in the radiative capture of He3 by Li7. Some indication of these resonances is seen. Their alpha-particle widths are apparently small compared to their total widths. (Author)

AD-613 127 Div. 20

New York Univ., N. Y.
EXTRAPOLATION OF CROSS-SECTION DATA TO ZERO ENERGY FOR LONG-RANGE EFFECTIVE POTENTIALS. Doctoral thesis (revised ed.),
by R. Oppenheim Berger, Thomas F. O'Malley, and Larry Spruch. 25 Sep 64, 8p
Contracts Nonr28549, DA30 69ORD2581,
Projs. 2360, 012 109

Unclassified report

Pub. in Physical Review (U. S.) v137 n4A p1068-75 Feb 15 1965 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 16 Jun 64.

Descriptors: (*Elastic scattering, Electrons), (*Potential scattering, Mathematical prediction), (*Nuclear cross sections, Potential scattering), Phase shift, Electrostatics, Atomic energy levels, Numerical analysis.

The effective one-body potential representing a particle-compound-system interaction usually has a very complicated short-range behavior, but a relatively simple, and more or less known, long-range tail U which can be non-

local and energy-dependent. With U present, the usual effective-range-theory (ERT) expansion for a single-channel scattering phase shift eta is inapplicable. Recent extensions of ERT include the effects of long-range potentials, but since eta then becomes very energy-dependent, one would need many terms to obtain the desired accuracy, so the results are of restricted use. We show that one can first solve, numerically, a one-body problem which includes only U, and then use a modified ERT expansion for the difference delta between eta and the phase shift due to U alone. Since the rapid energy dependence due to U is thus extracted out (exactly), terms in the expansion which depend upon the short-range potential in the presence of U are more slowly varying in energy; they involve a number of adjustable parameters to be determined experimentally, but only a few are usually needed. The procedure thus makes possible the extrapolation of low-energy scattering data down to zero energy, even when effective long-range potentials are present. (Author)

AD-613 132 Div. 20

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
PERMISSIBLE LEVELS OF SURFACE CONTAMINATION,
by William R. Bush. 1964, 8p AECL-2115
Unclassified report

Pub. in mono. Radiation Accidents and Emergencies in Medicine, Research and Industry pub. by C. C. Thomas, Springfield, Ill., p156-62 n.d.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radiological contamination, Surfaces), (*Health physics, Radiological contamination), Safety, Respiration, Air, Alpha particles, Beta particles.

Surface contamination is undesirable because it gives to radiation hazards. Inhalation hazard is often the determining factor in setting contamination limits; however, external radiation could be a greater hazard under some circumstances. The relationship between contamination level and radiation hazard is not precise, because of wide variations in actual conditions. Permissible levels of contamination are based on many arbitrary assumptions. When assessing dangerous levels of contamination, permissible levels should be recalculated using the best information available for all parameters. Potentially dangerous areas should be identified with respect to the maximum degree of danger likely to be met in a contamination accident. There are some important aspects of the contamination problem that have not been considered, such as the relative degree of hazard from inhalation and external radiation under various conditions, and the need for ventilation, filtration and containment after a contamination accident. There are many possibilities for research into such problems.

AD-613 144 Div. 20, 30

Washington Univ., Seattle.
ACCURACY OF BUBBLE LOCATION IN A BUBBLE CHAMBER,
by Robert W. Williams. 14 Sep 61, 3p
Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v32 n12 p1378-80 Dec 61 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bubble chambers, Effectiveness), Bubbles, Protons, Particle trajectories, Measurement, Errors, Hydrocarbons.

A measurement is reported of individual bubble locations along tracks of high-energy protons in a very small, short time scale pentane bubble chamber. Track distortions of the usual kind are greatly reduced in this system, so that one is measuring, to a precision of a few microns, the deviation of the true centers of the bubbles from the particle path. The average deviation in bubble position measurement is found from second differences to be 3.8 microns in space, most of which is shown to be accounted for by measurement errors. The average bubble is thus found to be centered on the track to better than 4 microns in hydrocarbons; however, an occasional bubble will be off by many times the average deviation. Arguments are advanced to show that a similar precision should obtain in hydrogen. This result is shown to be in general agreement with the bubble-chamber theory of Seitz. (Author)

AD-613 158 Div. 20

Research Lab of Electronics, Mass. Inst. of Tech., Cambridge.
NUCLEAR MOMENTS AND ISOTOPE AND ISOMER SHIFTS OF NEUTRON-DEFICIENT MERCURY ISOTOPES 195, 195m, 194, 193, 193m and 192,
by W. J. Tomlinson III and H. H. Stroke.
25 May 64, 21p
Unclassified report

Pub. in Nuclear Physics (Netherlands) v60 p614-633 1964 (Copies available only to DDC users).
Research supported in part by the Army Signal Corps., the Air Force Office of Scientific Research, and the Office of Naval Research.

Descriptors: (*Mercury, Isotopes), (*Nuclear moments, Mercury), (*Isomeric transitions, Mercury), Nuclear isomers, Nuclear structure, Nuclear spins, Nuclear magnetic moments, Nuclear electric moments, Odd-even nuclei, Hyperfine structure, Radioactive isotopes.

Nuclear spins I, magnetic-dipole mu and electro-quadrupole Q moments, and optical spectroscopic isotope and isomer shifts (I.S.) have been obtained for the neutron-deficient mercury isotopes and isomers with mass numbers from 192 to 195. The isotopes were produced by p, yn reactions on Au197. Approximately 0.01 micro g of Hg was transferred into the rf-excited electrodeless light sources. A well-blazed plane diffraction grating, 25 cm wide, was used in the multiple wavelength monochromator of 11 m focal length for these high-resolution optical hfs measurements. These lead to the results I = 1/2 for Hg195, I = 13/2 for Hg195m and Hg193m; mu = -1.05, 0.53, -1.04 nm for Hg193m, Hg195, Hg195m; Q = 1.37, 1.41 b for Hg193m, Hg195m; with respect to Hg198, I.S. = 0.441±0.020, 0.368±0.006, 0.284±0.007, 0.214±0.008, 0.220±0.005 1/cm for Hg192, Hg193m, Hg 194, Hg195 and Hg195m. For Hg193 the tentative results are I = 1/2, mu = 0.56 nm, and I.S. = 0.350±0.027 1/cm; the last result was obtained by Walter and Stroke in a magnetic-scanning experiment. The isotope- and isomer-shift results, which have led to a hypothesis of the cause of odd-even staggering in isotope shift, are discussed qualitatively in the light of the polarizability of nuclei by nucleons (coupling of core-excited states with odd particle). (Author)

21. Nuclear Propulsion

No Entries

22. Ordnance

AD-612 502 Div. 22
CFSTI Prices: HC$2.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
DETERMINATION OF FEASIBILITY FOR DEVELOPING DISPOSABLE SHIPPING-CRATE LAUNCHER FOR M55 ROCKET.
Rept. for Dec 63-Feb 64,
by Rosetta L. Davis. Sep 64, 42p
Special pub. CRDL-SP-1-50
Proj. 1C522301A081

Unclassified report

Descriptors: (*Rocket launchers, Feasibility studies), (*Containers, Rocket launchers), Rockets, Shock resistance, Supports, Captive tests, Disposal, Design, Range tables.

The shipping crate as constructed is rugged enough to withstand the shock of firing. From the limited data available, the type of support used shows promise. For convenience and simplicity, a single jack strip containing all 15 plugs would be more expedient. The method of elevation of the crate needs to be perfected for operation under field conditions. A simple dovetail sight mount should be used with those sights available in the field. It should be determined if a single crate fired at all elevations can be used unshackled. If it can, then for tactical purposes a simple 15-stop stepping switch should be designed, cheap enough to be expendable. The use of varying power sources, i.e., wet cell, dry cell, thermocell, etc., should be considered. The concept of using a shipping crate as a launching vehicle is highly feasible and should be developed. The uses of this end item should be unlimited. (Author)

AD-612 503 Div. 22, 9, 12
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
PURE FLUID TECHNOLOGY AND POSSIBLE ORDNANCE APPLICATIONS,
by David L. Blanchard and Clinton J. Sewell.
30 Dec 64, 37p NOLTR-64-115
Tasks RMM053002F008 08 13, RMM022006F008 08 07

Unclassified report

Descriptors: (*Control systems, Fluid flow), (*Circuits, Simulation), (*Amplifiers, Simulation), (*Arming devices, Control systems), Coanda effect, Momentum, Relaxation oscillators, Feedback, Jets, Deflection, Analog systems, Theory, Signals, Guided missile warheads, Guided missile safety, Guided missiles (Surface-to-surface).

Pure fluid, i.e. no moving parts, technology is a new and rapidly expanding field which shows much promise for many applications where it is desirable to have a rugged and dependable logic system. The primary purpose of the report is to combine much of the basic knowledge of the state-of-the-art of pure fluids and to investigate ordnance applications. The report explains the basic operation of the bi-stable amplifier, analogue amplifier, or/nor element, flip-flop, binary counter, and simple oscillator. It further discusses some sensors which are either pure fluid or give a fluid signal. Proposed pure fluid circuits for free fall, tactical missile and ballistic missile applications are included. Free fall and tactical missile laboratory breadboard pure fluid circuits were successfully demonstrated. (Author)

AD-612 515 Div. 22, 9, 15
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
A METHOD FOR COMPUTING TRAJECTORIES OF STORES LAUNCHED FROM AIRCRAFT,
by James H. Nichols, Jr. Nov 64, 28p
Rept. nos. 1878, Aero-1079

Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*External stores, Trajectories), (*Trajectories, External stores), Aircraft, Launching, Weapon systems, Exterior ballistics, Determination, Aerodynamic characteristics, Euler's angles, Programming (Computers).

Weapons system development should include investigation of adverse interference between aircraft and weapon during design stages, or at least preceding flight. To this end, equations are presented for computing trajectories of store during and following its launch from airplane. These equations, in six degrees of freedom, were developed for use at Aerodynamics Laboratory for specific purpose of using wind-tunnel test results in conjunction with the point-prediction technique. However, equations are adaptable to other methods of trajectory prediction. (Author)

AD-612 875 Div. 22, 2, 18
CFSTI Prices: HC$4.00 MF$0.75

Barodynamics, Inc., Georgetown, Colo.
BOMB PENETRATION TESTS, FORT CHURCHILL, CANADA.
Final rept.,
by Clifton W. Livingston. Sep 60, 111p
Contract DA11 190ENG22, Proj. 22 4 7
CRREL TR-71; PB 157 601

Unclassified report

Descriptors: (*Ammunition, Explosion effects), (*Soils, Penetration), (*Fortifications, Preparation), General purpose bombs, Armor piercing ammunition, Mortar ammunition, Bomb trajectories, Projectile trajectories, Fragmentation, Terminal ballistics, Creep, Tests, Feasibility studies, Airborne, Canada.

Inert mortar shells and inert general-purpose, semi-armor-piercing, and armor-piercing bombs were dropped on frozen ground (glacial till) near Fort Churchill, Manitoba, Canada during the winter 1956-57 to observe projectile penetration and determine the feasibility of forming trenches and foxholes in frozen ground by means of bombs released from aircraft. Projectiles ranging from 81-mm mortar shells to 1600 AP bombs were released from altitudes of 2000 to 24,500 ft. Analysis of the test data was directed towards determining fundamentals of penetration of projectiles into materials of the earth's crust. (Author)

AD-612 884 Div. 22
CFSTI Prices: HC$2.00 MF$0.50

Frankford Arsenal, Philadelphia. Research and Development Directorate.
COMBUSTIBLE AMMUNITION FOR SMALL ARMS. IV. DEVELOPMENT OF IMPROVED OBTURATOR DEVICES FOR CASELESS AMMUNITION.
Technical research rept. for Jan 62-Aug 63,
by John J. Scanlon, Joseph B. Quinlan, and Earl F.

Vanartsdalen. Jan 65, 29p Rept. no. R-1750
Proj. 1C523801A293 Unclassified report

Descriptors: (*Small arms ammunition, Obturation (Ballistics)), (*Obturation (Ballistics), Small arms ammunition), Ammunition components, Ammunition propellants, Primers, Small arms, Projectiles, O-rings, Materials.

An obturator, reusable for approximately 60 firings of 7.62 mm caseless ammunition, was designed, fabricated, and evaluated. This obturator consisted of two metal split rings with a neoprene O-ring positioned between them. A 7.62 mm caseless test weapon (Model 4) was designed and fabricated for this investigation, and a Springfield 1903 rifle was similarly modified for shoulder firing 7.62 mm caseless ammunition before the U. S. Army Infantry Board during June 1962. A combination obturator/firing pin projectile (designated 'Bulpin') was designed, fabricated, and evaluated for caliber .30 caseless solid propellant ammunition. Two such Bulpin projectiles, one in front of a bore-size caseless charge containing a combustible primer and one behind it for ignition and obturation, provided a solid propellant caseless system which used a new firing pin and seal for each firing. After each firing, the rear projectile was pushed forward by the next Bulpin round for use as the next projectile. There are indications that, in caseless solid propellant ammunition, the increased ratio of propellant charge length to propellant charge diameter results in lower projectile velocity and higher peak pressure and that increased molding pressure in the forming of the propellant results in higher velocity and higher peak pressure. (Author)

AD-612 929 Div. 22, 9
CFSTI Prices: HC$2.00 MF$0.50

Michigan Univ., Ann Arbor. Coll. of Engineering.

A HYDRODYNAMIC THEORY FOR THE INTERACTION OF A GASEOUS DETONATION WITH A COMPRESSIBLE BOUNDARY.
Technical rept.,
by Martin Sichel. Feb 65, 45p Rept. no. 05170-2-T
Grant DA ARO D31 124G345, Projs. 3559E, 05170
AROD 3559:2

Unclassified report

Descriptors: (*Detonation waves, Propagation), (*Explosive gases, Detonations), Hydrodynamics, Compressible flow, One-dimensional flow, Thickness, Velocity, Mathematical analysis, Schlieren photography.

Detonations through an explosive of finite width are curved and propagate at a lower velocity than an ideal one-dimensional plane wave. A theory relating the velocity decrement and curvature of a gaseous detonation to the conditions at the explosive inert interface is developed. A two-dimensional detonation bounded on one side by a solid wall and on the other by an inert gas is considered. Approximate reaction zone equations are derived by expanding the flow variables in powers of a small parameter proportional to the ratio of reaction zone thickness to radius of curvature. Locally the reaction zone equations are the same as for one-dimensional flow with increasing area and heat addition, the rate of increase depending on the local wave curvature and the density variation through a plane detonation. Using Fay's result that the relative detonation velocity decrease is proportional to the fractional increase in the reaction zone streamtube area, an ordinary differential equation for variation of the wave angle is developed. Approximate solutions of the above equation yielded velocity decrements which agreed with experimental results. (Author)

23. Personnel and Training

AD-612 673 Div. 23
CFSTI Prices: HC$1.00 MF$0.50

Naval School of Aviation Medicine, Pensacola, Fla.
THE RELATIONSHIP BETWEEN THE RANK OF INCOMING OFFICERS AND COMPLETION OF FLIGHT TRAINING,
by Charles W. Hutchins, Jr. 20 Nov 64, 15p
Research rept. MR-005.13-3003-R-41, NSAM-911
Task 1

Unclassified report

Descriptors: (*Officer personnel, Naval training), (*Aviation personnel, Naval training), (*Naval training, Mathematical prediction), Naval personnel, Marine Corps, Correlation techniques, Factor analysis, Distribution.

The 1636 U. S. Navy and Marine officers who entered flight training during the calendar years of 1960 and 1961 were compared on various types of attrition in order to determine if there were any significant differences in attrition associated with rank. A second part of the study was devoted to the investigation of rank as a predictor variable. The results indicated that the higher ranking officers had a higher attrition rate, mainly in the category of voluntary withdrawal. The rank of the incoming officer when used as a predictor variable significantly increased the validity of predicting both completion of flight training and voluntary withdrawal from this training. (Author)

AD-612 738 Div. 23, 28
CFSTI Prices: HC$1.00 MF$0.50

Pittsburgh Univ., Pa.
REPETITION AND SPACED REVIEW IN PROGRAMED INSTRUCTION.
Final rept. for Oct 61-Oct 62,
by James H. Reynolds, Robert Glaser, John S. Abma, and Ross L. Morgan. Dec 64, 37p
Contract AF33 616 7175, Proj. 1710, Task 171007
AMRL TR-64-128

Unclassified report

Descriptors: (*Education, Effectiveness), (*Retention, Achievement tests), Recall, Learning, Training, Intelligence tests, Students, Linear programming, Correlation techniques.

The effects of repetition and spaced review in programed instruction were studied. Experiments 1 and 2 covered a one-semester course in General Science at the Junior High School level. In Experiment 3, a 1280-frame portion of the total course was used. In Experiments 1 and 2, comparisons were made among (a) a conventional course, (b) a regular linear version of the program, and (c) a spiral version of the program. The results indicate that the programed course was at least as effective as the conventional instruction in terms of both learning and retention after 15 weeks. The linear program was superior to conventional instruction on some measures. The spiral program offered few, if any, advantages over the regular linear program. Experiment 3 allowed a more precise evaluation of the separate effects of repetition and spaced review. Spaced review produced significant increases in learning which persisted, and even increased, through a 3-week retention interval. Repetition did not produce increased learning or retention. The general conclusions are: (a) repetition of instructional materials above the usual level in a linear program is not beneficial; (b) spaced review is potentially beneficial; and (c) some techniques of obtaining spaced review, eg, spiral programing, may offer disadvantages that equal or outweigh the potential advantages of spaced review. (Author)

AD-612 918 Div. 23, 1, 18, 28
CFSTI Prices: HC$2.00 MF$0.50

Naval Air Development Center, Johnsville, Pa. Aeronautical Instruments Lab.
INTEGRATED COCKPIT INSTRUMENTATION SYSTEM STUDY FOR P3B 'VP A-NEW' WEAPON SYSTEM AIRCRAFT COCKPIT ANALYSIS (U).
Interim rept. for 23 Nov 64-1 Mar 65,
by George W. Hildebrand. 17 Mar 65, 45p
Rept. no. NADC-AI-6518
Task RAV09J011/2021/F012-04-04

Unclassified report

Available copy will not permit fully legible reproduction.
Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Flight instruments, Human engineering), (*Cockpits, Patrol planes), (*Flight crews, Job analysis), Aviation personnel, Pilots, Visual inspection, Personnel management, Display systems, Antisubmarine warfare, Weapon systems.

The report is on the study of the P3/A-NEW Weapon System aircraft cockpit area. The material presented is an analysis of P3 cockpit operation which reflects the tasks and responsibilities of the flight crew. It is recommended that (a) the responsibility designations specified in this report be correlated with anthropological data to obtain the optimum areas for controls and displays location, and (b) the parameter responsibility designations form the basis for the development of an integrated display concept for the P3/A-NEW aircraft.

AD-612 956 Div. 23, 30
CFSTI Prices: HC$3.00 MF$0.75

System Development Corp., Santa Monica, Calif.
COMPUTER PROGRAMMER SELECTION AND TRAINING IN SYSTEM DEVELOPMENT CORPORATION,
by Dallis Perry and Gordon Cantley. 2 Feb 65, 64p
Rept. no. TM-2234

Unclassified report

Descriptors: (*Personnel management, Programmers), (*Programmers, Training), Programming (Computers), Data processing systems, Performance tests, Job analysis, Selection, Wages, Tables.

The programming field is described in terms of the knowledge required, the nature of the programs which are produced, and the activities involved in producing programs and data bases. These elements may be grouped in many different ways to form specific programming jobs. An initial analysis has identified 17 such jobs. SDC requirements for programmer trainees include U. S. citizenship, a Bachelor's degree, with an emphasis on 'rigorous' subject matter such as mathematics, and satisfactory performance on tests of verbal and reasoning ability. About one out of eight applicants is accepted for training. SDC (and SDD) trained more than 2300 persons in computer programming from 1955 to 1964. Of these, nearly 2000 were programmer trainees, and the remainder were other SDC and non-SDC employees. The peak year was 1959, when nearly 500 persons were trained. The training program has consisted of two major parts: training in how to program and training in the program system to be worked on. The initial training consisted of Q-7 machine-coding, given by IBM instructors, and SAGE program system instruction, given by SDD personnel. SDD instructors took over the entire program in 1957. Compensation of SDC programmers is bases on a combination of survey data, which indicate appropriate salary ranges, and performance ratings, which help determine each employee's position within the appropriate salary

range. The period of greatest loss of trained programmers is during their second and third years of employment. About 50 percent stay at least four years. Primary reasons for leaving are to obtain higher salaries and broader experience. (Author)

AD-612 999 Div. 23, 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
EFFECTS OF INDIVIDUALIZED INSTRUCTION ON TESTING.
Professional paper,
by John F. Cogswell and John E. Coulson. 22 Feb 65, 12p Rept. no. SP-1829
Unclassified report

Presented on February 11, 1965, to the National Council on Measurement in Education, in Chicago, Ill.

Descriptors: (*Education, Programming (Computers)), (*Training devices, Automatic), Performance (Human), Tests, Attitudes, Learning, Students, Teaching machines.

Programmed instruction and other individual study methods are bringing major changes in measurement practices. Recent experimental work with computer-based programmed instructional systems has demonstrated the technological feasibility of automated diagnostic procedures that provide increased sensitivity and responsiveness to student needs, through continuous analysis of several different measures of each student's progress and through individualized control of the instructional sequence. The computer's control decisions can be based on rules synthesizing (a) measures of the student's moment-to-moment skill performance level and attitude toward the learning situation, and (b) records reflecting more stable, pervasive characteristics, such as tests of intelligence, aptitude, personality and interests. If the diagnostic capabilities offered by these technological developments are to be applied in education, further research must be directed toward the teaching/testing process in programmed instruction. Critical research questions include: (1) What diagnostic measures most accurately reflect immediate learning needs. (2) How often should each measure be sampled during the instruction. (3) By what rules should these measures be combined to determine branchings. (4) How can the success of branching procedures best be evaluated. (Authors)

24. Photography and Other Reproduction Processes

AD-612 519 Div. 24, 30

London Univ. (England). Inst. of Laryngology and Otology.
SIMPLE ELECTRONIC STROBOSCOPE. USE OF TWO FLASH-TUBES FOR MULTIPLE EXPOSURE PHOTOGRAPHY,
by J. D. Pye. 1964, 4p
Grant AF EOAR64 47
AFOSR 65-0310
Unclassified report

Pub. in Wireless World (Gt. Brit.) v70 n7 p339-42 Jul 1964 (Copies available only to DDC users).

Descriptors: (*Stroboscopes, Circuits), Electronic equipment, Photographic equipment, High-speed photography, Voltage, Capacitors, Great Britain.

A description is given of the circuitry and operating principles of the stroboscope.

AD-612 637 Div. 24, 25
CFSTI Prices: HC$1.00 MF$0.50

Optics Technology, Inc., Belmont, Calif.
ROLE OF FIBER OPTICS IN PHOTOGRAPHY,
by N. S. Kapany. 1964, 4p
Contract AF49 638 1200
AFOSR 65-0445
Unclassified report

Also included in International Commission for Optics, Conference on Photographic and Spectroscopic Optics, 1-8 Sep 64, held at Tokyo and Kyoto.

Descriptors: (*Fiber optics, Photography), (*Photography, Fiber optics), Image intensifiers (Electronics), Resolution, Optical equipment, Photoelectric effect.

Fiber optics assemblies in the form of field flatteners, image dissectors, image intensifiers, FOCONS, and fiber coupling plates are described for use in various high speed, high resolution photographic systems and photoelectronic devices.

AD-612 790 Div. 24, 25
CFSTI Prices: HC$1.00 MF$0.50

Air Force Avionics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
PRECISION RANGE-GATED IMAGING TECHNIQUES.
Rept. for Mar-Sep 64,
by Don B. Neumann. Jan 65, 23p AL TR-64-278
Proj. 5237, Task 523705
Unclassified report

Descriptors: (*Photographic lighting systems, Lasers), (*Lasers, Photographic lighting systems), (*Range finding, Lasers), Aerial photography, Photographic images, Camera controls, Kerr cells, Fiber optics, Timing devices, Ruby, Crystals.

By properly delaying the 50-nanosecond shutter of an image-converter camera with respect to a transmitted 60- nanosecond illuminating pulse from a Q-switched ruby laser, it is shown that the image formed may be limited to only those objects located in a certain range interval. Using this technique, it is shown that the visibility through atmospheric scattering mediums (such as snow) may be greatly increased. In addition, it is shown that the use of the technique enables range information to be added to an image (such as the elevation contours in an aerial photograph). (Author)

25. Physics

AD-612 457 Div. 25

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
MAGNETIC SUSCEPTIBILITY OF 2 3S1 STATE OF HELIUM AND SOME LIKE IONS,
by John T. McMullan and R. P. Hurst.
5 Mar 64, 5p Rept. no. CAL-RA-1761-P
Grant AF AFOSR191 63
AFOSR 65-0441
Unclassified report

Pub. in Physical Review (U. S.) v135 n4A pA973-7 Aug 17 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetic properties, Helium), (*Helium, Magnetic properties), Quantum mechanics, Ions, Electron transitions, Ground state.

The magnetic susceptibility of the 2 3S1 state of helium and some like ions is computed using a thirty-five term wave function of the type originally proposed by Hylleraas and Undheim. It is found that it is possible to obtain highly accurate values for the magnetic susceptibility using this wave function if the parameters are accurately determined. Finally, an argument is given which suggests that the magnetic susceptibility obtained in the present work is accurate to at least five significant figures. (Author)

AD-612 458 Div. 25, 2

Narragansett Marine Lab., Univ. of Rhode Island, Kingston.
CORRELATION OF 630-cps SHALLOW-WATER AMBIENT NOISE WITH WIND SPEED AND WAVEHEIGHT, Final rept.,
by W. S. Penhallow and F. T. Dietz. 16 Jul 64, 7p
Technical rept. no. TR-12, Ref-64-7
Contract Nonr39604, Proj. NR186 300, RF001 03 06
Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n11 p2149-51 Nov 1964 (Copies not available to DDC or Clearinghouse customers)
See also PB-158 571, AD-266 592, AD-268 171, AD-419 532, AD-424 974.

Descriptors: (*Underwater sound, Noise), (*Acoustics, Underwater sound), Underwater sound signals, Wind, Velocity, Ocean waves, Sea water, Acoustic equipment, Narragansett Bay, Mechanical waves.

The sound-pressure spectrum level derived from a 1/3-octave filter centered at 630-cps was chosen to study the mutual associations among ambient noise, wind speed, and waveheight in Narragansett Bay, Rhode Island. Data were divided into three groups corresponding to relatively steady, increasing, or decreasing wind speeds. The results of correlation analyses indicate that wave-height is as significantly related to the sound-pressure spectrum level at 630 cps in this locale as is wind speed, provided that the wind speed is relatively constant. Wind speed is the more significant factor of the two under transient wind conditions. (Author)

AD-612 459 Div. 25, 14
CFSTI Prices: HC$1.00 MF$0.50

Eastman Kodak Co., Rochester, N. Y.
LASER MATERIAL STUDY,
Final rept. for Jul 62-Jun 64,
by Paul Mauer. 22 Feb 65, 21p
Contract Nonr383400, Proj. 7300, ARPA Order 306 62
Unclassified report

See also AD-604 443.

Descriptors: (*Lasers, Glass), (*Glass, Lasers), (*Fluorescence, Glass), Lanthanum compounds, Barium compounds, Borates, Lithium compounds, Sodium compounds, Silicates, Potassium compounds, Impurities, Neodymium, Rods, Optical equipment components.

A critical comparison of three types of neodymium doped laser glass was conducted. The glasses were chosen because of their widely differing fluorescence characteristics. The three consisted of a lanthanum-barium borate, a lithium-sodium silicate, and a barium crown. The glasses were fabricated into rods, 1.27 cm diameter and 30.5 cm long. Fluorescence decay data, optical quality data, output-input data and field patterns, are included in the report. The fluorescence characteristics were less significant than optical quality as a determinant in laser behavior. (Author)

AD-612 469 Div. 25, 8
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Defense and Space Center, Baltimore, Md.
DEVELOPMENT OF MILLIMETER AND SUBMILLIMETER MASER DEVICES.
Interim technical rept. no. 6, 1 Nov 64-28 Feb 65,
by W. E. Hughes, C. R. Kremenek, and W. E. Richards.
28 Feb 65, 42p Rept. no. 490F
Contract AF33 657 10472
Unclassified report

See also AD-607 983.

Descriptors: (*Masers, Operation), X band, Materials, Powders, Single crystals, Aluminum compounds, Nitrates, Titanium compounds, Dioxides, Rutile, Impurities, Iron, Crystal growth, Magnetic fields, Cavity resonators, Electromagnetic pumps, Gain, Traveling-wave tubes, Waveguides.

The major effort was directed toward the operation of masers in the absence of an applied external magnetic field. The effort was divided into two specific areas; i.e., 9.3 gc and 81 gc. Zero field masers were successfully operated in both areas and the description of their operation comprises the bulk of this report. Each maser is described in detail and the conclusions drawn from experiments are given. (Author)

AD-612 471 Div. 25, 7
CFSTI Prices: HC$2.00 MF$0.50

Plasma Physics Research Lab., Univ. of Minnesota, Minneapolis.
BASIC PHENOMENA IN THERMIONIC ENERGY CONVERTERS.
Final rept. for 1 Feb 61-1 Nov 63,
by Hendrik J. Oskam. Jun 64, 42p
Contract AF19 604 8072, Proj. 6694, Task 669409
AFCRL 64-560; N64 31402
Unclassified report

Descriptors: (*Thermionic converters, Physics), (*Physics, Thermionic converters), Cathodes, Electrical discharges, Charged particles, Transport properties, Electric fields, Plasma medium, Diodes, Helium, Neon, Ionization, Ionization potentials, Equations.

The report is a summary of the study of a few phenomena

related to the physics of thermionic energy converters as well as the investigation of the processes responsible for the high efficiency of the hollow-cathode discharge. Machine computations of the transport of charged particles under the influence of both electric fields and density gradients, while allowing for a changing particle energy, revealed the possibility of ionization of neutral particles by electrons having traversed a voltage difference smaller than the ionization potential of the neutral particles involved. The theoretical results obtained are compared with experimental data. A systematic study of the current-voltage characteristics of a plane and hollow-cathode discharge led to a considerably better insight in the significance and magnitude of the hollow-cathode discharge mechanism. (Author)

AD-612 472 Div. 25, 15
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
TWO-PARTICLE CLUSTER THEORY OF ANTIFERROMAGNETISM,
by Herbert B. Callen and Earl Callen. Feb 65, 23p Technical rept. no. TR-22
Contract Nonr55136

Unclassified report

Prepared in cooperation with Naval Ordnance Lab., White Oak, Md. and Catholic Univ. of America, Washington, D. C.

Descriptors: (*Antiferromagnetism, Theory), (*Series, Antiferromagnetism), Perturbation theory, Field theory, Spin, Phase studies, Ions, Crystal lattices.

The two-spin cluster theory of Strieb, Callen and Horwitz, is extended to antiferromagnets. The theory is formulated to include nearest and next-nearest neighbor exchange (J sub 1 and J sub 2) and to apply to those types of antiferromagnetic Neel phases in which equal numbers of spins are nominally 'up' and 'down'. When J sub 2 = 0 the theory reduces to the antiferromagnetic constant coupling theory of Kasteleijn and van Kranendonk. Consequently the theory suffers from the defect of an anti-Neel transition at low temperatures. (Author)

AD-612 473 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
MAGNETIZATION OF SPIN IMPURITIES IN FERROMAGNETS,
by Herbert Callen, Daniel Hone, and Allan Heeger. Feb 65, 12p Technical rept. no. TR-21
Contract Nonr55136

Unclassified report

Descriptors: (*Ferromagnetism, Spin), (*Spin, Impurities), (*Field theory, Molecules), Ions, Perturbation theory.

Direct calculation of the spectral weight function of spin impurities in ferromagnets provides a rationale for the empirical fact that the impurity magnetization obeys the molecular field theory more accurately than does the host. (Author)

AD-612 485 Div. 25, 8
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Electric Corp., Youngwood, Pa. Semiconductor Div.
DENDRITIC SOLAR CELL AND ARRAY INVESTIGATION.
Interim progress rept. no. 6, 1 Dec 64-1 Mar 65,
ed. by K. S. Tarneja. 1 Mar 65, 36p
Contract AF33 615 1049, Proj. 8173

Unclassified report

Descriptors: (*Solar cells, Manufacturing methods), (*Semiconducting films, Solar cells), (*Epitaxial growth, Semiconducting films), Silicon compounds, Oxides, Single crystals, Silicon, Semiconductor devices, Films, Radiation damage, Aluminum, Ceramic coatings, Drift, Structure, Design, Impurities, Boron.

The report discusses the continued development of drift field solar cells using epitaxial growth techniques and solar cell panel fabrication and array design studies. Modifications in the graphite resistance epitaxial system are discussed. Attempts to grow SiO2 films directly on the diffused cell surface were made. Results of the irradiation series of 1 MeV electrons on A1-doped solar cells are presented. The module and the panel size using the 'slotted angle' design has been finalized. Design studies of arrays up to 20 square feet are presented and discussed. (Author)

AD-612 501 Div. 25, 30
CFSTI Prices: HC$1.00 MF$0.50

Rochester Univ., N. Y. Dept. of Physics and Astronomy.
LIGHT FLUCTUATIONS AS A NEW SPECTROSCOPIC TOOL,
by E. Wolf. 1964, 2p
Grant AF AFOSR237 63
AFOSR 65-0442

Unclassified report

Also includes International Commission for Optics, Conference on Photographic and Spectroscopic Optics, 1-8 Sep 64, held at Tokyo and Kyoto. Summary only.

Descriptors: (*Light, Theory), (*Spectroscopy, Light), Lasers, Thermal radiation, Photons, Intensity, Correlation techniques, Photoelectric effect, Reviews.

A summary is given of a lecture on basic concepts relating to the theory of light fluctuations, features which distinguish the fluctuation properties of thermal and laser light, and new techniques for obtaining information about spectra from fluctuation and correlation measurements. In particular, methods depending on beat phenomena, photo-electric mixing experiments, intensity correlation interferometry, photon coincidence experiments and pulse counting techniques will be reviewed and the possibility of obtaining spectral information from statistical studies of transient interference patterns are considered. Current researches relating to the determination of the phase of the second order complex degree of coherence are discussed. The concept of higher order spectra is explained and the possibility of obtaining some information about them from multiple photon coincidence experiments is mentioned. (Extracted)

AD-612 509 Div. 25, 17
CFSTI Prices: HC$0.75 MF$0.50

Naval Research Lab., Washington, D. C.
CHANGES IN CONTACT POTENTIALS OF METALS CAUSED BY ADSORBED MONOLAYERS.
Interim rept.,
by K. W. Bewig, C. O. Timmons, and W. A. Zisman.
12 Feb 65, 31p Rept. no. NRL-6200
Proj. RR001 01 43 4751

Unclassified report

Descriptors: (*Monomolecular layers, Adsorption),

(*Metals, Monomolecular layers), (*Voltage, Monomolecular layers), (*Surface properties, Monomolecular layers), Hydrocarbons, Carbon compounds, Chlorides, Fatty acids, Amines, Aromatic compounds, Phosphates, Esters, Polarization, Liquids, Controlled atmospheres.

A classic problem in the physics and chemistry of surfaces has been the successful utilization of changes in the contact potential difference between two metals as a means of studying surface properties and adsorption. Recent advances in experimental techniques, especially the use of a flurorcarbon coating on the reference elec trode, have made possible a number of advances in the study of the surface potential changes resulting from the adsorption of mono-layers of nonpolar liquids and of the higher molecular weight polar compounds. Studies have been made of adsorbed non-polar liquid compounds including the various hydrocarbons and carbon tetrachloride. Polar-nonpolar compounds, such as the homologous families of the fatty acids and amines as well as certain aromatic phosphate esters, have also been investigated with the new techniques. Reproducible and interesting results have been obtained, even though the measurements were made in the presence of atmospheric oxygen, nitrogen, and water vapors as well as any surface oxide development on the metal at ordinary temperatures; however, it was necessary to control the relative humidity and air temperature carefully, to use an atmosphere entirely free of organic vapors or polar inorganic compounds, to take great care in cleaning the metal surfaces, and to employ compounds of extremely high purity. (Author)

AD-612 516 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
BASIC THEORETICAL CONSIDERATIONS OF LIGHT AMPLIFICATION BY STIMULATED EMISSION OF RADIATION.
Technical research rept.,
by Alexander J. Casella. Nov 64, 77p
Rept. no. R-1743
Proj. 1A013001A091A

Unclassified report

Descriptors: (*Lasers, Theory), Electrons, Oscillators, Quantum mechanics, Electron transitions, Perturbation theory, Excitation, Absorption, Emissivity, Cavity resonators, Ruby, Atomic energy levels, Amplifiers.

A theoretical development of the basic physical principles of Light Amplification by Stimulated Emission of Radiation (LASER) is presented. The processes of absorption and emission are presented in a general manner, using both a classical and quantum mechanical approach. The classical approach involves the approximation of the motion of an atomic electron as a driven oscillator. The quantum mechanical approach employs the time-dependent perturbation approximation to develop the transition rates for absorption and emission. A brief discussion of the lifetime and spectral line width of excited energy states is presented due to their importance in considerations of the LASER. Following this general development of the absorption and emission processes; a qualitative discussion of the important aspects of the LASER mechanism is presented. A quantitative development of the conditions for amplification for the two basic types of LASER (the three-level and four-level types) is presented using ruby and neodymium-doped glass as typical examples. (Author)

AD-612 517 Div. 25, 20

Institute for the Study of Metals, Univ. of Chicago, Ill.
IMPURITY CONDUCTION IN TRANSMUTATION-DOPED p-TYPE GERMANIUM,
by H. Fritzsche and M. Cuevas. 4 Apr 60, 9p
Contract AF49 638 802
AFOSR TN-60-421

Unclassified report

Pub. in Physical Review (U. S.) v119 n4 p1238-45 15 Aug 60 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Semiconductors, Neutron bombardment), (*Neutron bombardment, Semiconductors), (*Germanium, Electrical properties), Single crystals, Impurities, Thermal neutrons, Neutron capture, Radioactive decay, Gallium alloys, Arsenic alloys, Selenium alloys, Hall effect, Resistance (Electrical), Field theory, Crystal lattice defects.

The Hall coefficient and resistivity of germanium single crystals bombarded with slow neutrons were measured between 1.2 and 300K. Slow neutron capture and subsequent nuclear transmutation produce majority impurities, gallium atoms, and compensating impurities, arsenic and selenium atoms. p-Type samples with a gallium concentration ranging from 8 X 10 to the 14th power to 5 X 10 to the 17th power per cc with a fixed compensation ratio of 0.40 were thus prepared and the impurity conduction was studied as a function of the average distance between the majority impurities. The effective radius a of the acceptor ground-state wave function is 90.1. A according to Miller's theory of impurity conduction, whereas a=40 A according to Twose's theory. The latter value agrees well with the effective radius of the Kohn-Schechter acceptor wave function. The activation energy of impurity conduction changes slowly with impurity concentration from 0.00035 to 0.00059 ev and agrees well with predictions of Miller's theory for gallium concentration below 5 X 10 to the 15th power per cc. Measurements on samples which contain different dislocation densities but identical impurity concentrations show that up to 10000 dislocations per sq. cm do not affect impurity conduction. (Author)

AD-612 520 Div. 25

RIAS, Inc., Baltimore, Md.
PHOTOCAPACITANCE EFFECTS IN ADDITIVELY COLORED ALKALI HALIDE CRYSTALS,
by D. Kahn and A. J. Glass. 10 Mar 60, 10p
Contract AF49 638 1017
AFOSR 3651

Unclassified report

Pub. in Physics and Chemistry of Solids (U. S.) v17 nos3/4 p210-9 1961 (Copies available only to DDC users).

Descriptors: (*Photoelectric effect, Alkali metal compounds), (*Alkali metal compounds, Halides), (*Potassium compounds, Halides), (*Color centers, Photoelectric effect), Crystals, Capacitance, Electrical conductance, Iodides, Bromides, Ionization, Recombination reactions, Circuits.

Additively colored alkali halide crystals were placed between current blocking electrodes and an increase in the capacitance and conductance of the crystal was found on illumination. A measurement of these quantities at frequencies between 2 and 1000 c/s has shown that the observed behavior follows quite closely a linearized theory developed by J. Ross MacDonald. The region of application of the theory was examined experimentally, and results show that the theory may be used for larger applied voltages than assumed in the theory. An analysis of the experimental data indicates that the field induced electrode breakdown for the larger voltages (approx. 5 V r.m.s.) is of such a nature that the equivalent circuit describing the crystal continues to be valid.

This has also been observed by others. Using the results of the theory the mobility of KI and KBr crystals at room temperature was measured. These determinations agree substantially with measurements by others using Hall effect methods. Measurements at low frequencies revealed phenomena due to the finite recombination rate of the conduction electrons and ionized F-centers. From an analysis of this behavior, the capture cross section of an ionized F-center in KBr was determined. The recombination rate constant in KBr was also measured. (Author)

AD-612 521 Div. 25

Brussels Univ. (Belgium).
NATURE OF THE CRYSTALLINE SOLID AT ELEVATED TEMPERATURES,
by Robert Brout, Stephen Nettel, and Harry Thomas.
29 Jun 64, 3p
Grant AF EOAR63 51
AFOSR 65-0418

Unclassified report

Pub. in Physical Review Letters (U. S.) v13 n15 p474-6 Oct 12 1964 (Copies available only to DDC users).

Descriptors: (*Crystal structure, High-temperature research), (*Melting, Crystals), Phonons, Quantum mechanics, Entropy, Solids.

AD-612 530 Div. 25

Oklahoma Univ., Norman.
EXPERIMENTAL STUDY OF RESONANCE RADIATION TRANSFER,
Revised ed.,
by H. Mochizuki and R. G. Fowler. 10 Aug 64, 5p
Contract AF49 638 639; Grant AF AFOSR62 378

Unclassified report

Pub. in Physical Review (U. S.) v137 n1A pA17-A21 Jan 4 1965 (Copies not available to DDC or Clearinghouse customers)
Revision of rept. dated 21 Jan 63.

Descriptors: (*Wave transmission, Resonance), (*Resonance, Light), Excitation, Mercury, Atoms, Gases, Photons, Phase shift, Resonance scattering, Resonance absorption.

Experimental investigations have been made of the transfer of mercury 2537-A radiation through a slab of natural mercury gas of various densities and dimensions, using a sinusoidally modulated (omega=2pi f, f=5 to 50 kc/sec) radio-frequency-excited (50-Mc/sec) source of 2537-A radiation. Transmitted radiation has been found to gain in phase relative to the source wave, while that which is scattered at 90 deg loses phase. From the radiation scattered at 90 deg, decay time constants of the imprisoned photons have been calculated by using the relation between the time constant T and the phase shift phi = arc tan omega T. The relation T varies as C sq/(K sq + C sq) where K is a constant, has been found for the dependence on the breadth C of the resonance tube as well as the well known dependence in T varies as in n on the molecular density n. On the other hand, the transmitted radiation obeys a relation T sub c varies as the square root of (nA) between the time constant T sub c corresponding to the advanced phase shift, the thickness A of the resonance tube, and n. The dependences on other factors have also been examined. (Author)

AD-612 532 Div. 25

Stanford Electronics Labs., Stanford Univ., Calif.
HALL MEASUREMENTS USING CORBINO-LIKE CURRENT SOURCES IN THIN CIRCULAR DISKS,
by M. G. Buehler, W. Shockley, and G. L. Pearson.
1964, 2p
Contract DA31 124ARO D155
AROD 2895-14

Unclassified report

Pub. in Applied Physics Letters (U. S.) v5 n11 p228-9 Dec 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hall effect, Disks), Electric currents, Magnetic fields, Voltage.

The measurement of the Hall effect using a square array of points centered on a circular disk has been investigated theoretically and experimentally.

AD-612 539 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Don Bosco Inst. for Research, Ramsey, N. J.
THE EFFECT OF STRUCTURAL DAMPING ON THE FORCED VIBRATIONS OF CYLINDRICAL SANDWICH SHELLS,
by Irving W. Jones and V. L. Salerno. Dec 64,
41p Rept. no. DBIR-105
Contract Nonr419900

Unclassified report

See also PB-149 662.

Descriptors: (*Structural shells, Sandwich construction), (*Vibration, Structural shells), (*Damping, Vibration), Cylindrical bodies, Pressure, Motion, Polymers, Elastomers, Numerical analysis.

An examination is made of the effects of structural damping on the axisymmetric forced vibrations of a cylindrical sandwich shell. The analysis is formulated by two methods, one exact but leading to lengthy calculations, the other a simple approximate formula requiring only a knowledge of the natural modes. In numerical examples, two steel-faced sandwich cylinders are compared. One has a polymeric, the other an elastomeric core. The results indicate that under a time-harmonic radial pressure they are both effective for suppressing resonant vibration, the polymeric core being generally more effective than the elastomeric core. (Author)

AD-612 540 Div. 25, 4
CFSTI Prices: HC$1.00 MF$0.50

Materials Research Lab., Pennsylvania State Univ., University Park.
EQUILIBRIUM VALUES FOR HIGH PRESSURE TRANSITIONS OF GERMANIUM AND A NEW HIGH PRESSURE FORM OF GERMANIUM,
by Carl H. Bates, Frank Dachille, and Rustum Roy.
Aug 64, 20p Technical rept. no. TR-19
Contract Nonr65620

Unclassified report

See also AD-282 966.

Descriptors: (*Germanium, Phase studies), (*Phase studies, Germanium), High pressure research, X-ray diffraction analysis, Temperature, Solid state physics, Crystal lattices, Semiconductors.

Very long runs, by superpressure standards, of up to three weeks near 100 kbars have demonstrated the extreme sluggishness of some transitions in Ge and other semiconductor systems. This raises serious questions about the significance of the pressure values

attached to various transitions and to the reality of some phase diagrams based on discontinuities observed in optical or electrical properties in an essentially dynamic system. The successful recovery of high pressure phases in semi-conductor systems by quenching to and working at 'dry ice' temperatures has been demonstrated. In the system Ge, a new high pressure polymorph, Ge-IV, has been synthesized above 110 kbars with a bcc structure analogous to Si. The equilibrium transformation pressure for the reaction Ge-I reversibly yields Ge-III(bct) has been revised downward from about 120 kbars to 40 kbars at 30C. The transition from the Ge-I diamond structure to the Ge-II white tin structure is always metastable. (Author)

AD-612 546 Div. 25, 4

Institute of Optics, Univ. of Rochester, N. Y.
TRAPPED EXCITONS IN DILUTE RARE-GAS ALLOYS,
by Giancarlo Baldini. 17 Aug 64, 6p
Unclassified report

Pub. in Physical Review (U. S.) v137 n2A pA508-13 Jan 18 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium group gases, Cryogenics), (*Absorption spectrum, Helium group gases), (*Electron transitions, Impurities), (*Solidified gases, Electron transitions), Ultraviolet spectroscopy, Perturbation theory, Resonance, Crystal lattice defects, Photons, Argon, Neon, Krypton, Xenon.

The ultraviolet absorption spectra of Ar, Kr, and Xe diluted in Ne, Ar, and Kr, have been measured at 6±2K. The several peaks observed are ascribed to perturbed atomic resonances and transitions to Rydberg states of the impurities. An empirical relation suggests that the modes of vibration of the impurities in the host-lattices are partly responsible for the half-widths of the peaks. (Author)

AD-612 566 Div. 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SPONTANEOUS BENDING OF THIN (111) CRYSTALS OF III-V COMPOUNDS,
by M. C. Finn and H. C. Gatos. 15 Mar 64, 6p
Contract SD90
Unclassified report

Pub. in Surface Science (Netherlands) v1 p361-66 1964 (Copies available only to DDC users).

Descriptors: (*Intermetallic compounds, Deformation), (*Crystal lattices, Intermetallic compounds), (*Deformation, Intermetallic compounds), Gallium alloys, Arsenic alloys, Indium alloys, Antimony alloys, Disks, Strain (Mechanics), Surface properties, Absorption, Crystal structure, Elasticity, Crystallography, Crystals.

Thin (111) wafers of GaAs, InAs, GaSb and InSb, 5 to 25 microns thick, were found to bend spontaneously, the A surface being convex. Such bending is consistent with the elastic strain energy associated with the distortion of the bonding configuration on the A surfaces of the III-V compounds. Exposure of the thin wafers to NH3 resulted in an increase in the radius of curvature whereas exposure to H2S resulted in a decrease in the radius of curvature. These effects are believed to result from preferential adsorption. (Author)

AD-612 567 Div. 25

Laboratoire d'Infra Rouge Technique et Applique, Gif-sur-yvette (France).
MODIFICATION OF THE CATHODOLUMINESCENCE OF CADMIUM SULFIDE AS A CONSEQUENCE OF THE SPEED OF ELECTRON BOMBARDMENT. (Modification de la Cathodoluminescence du Sulfure de Cadmium en Fonction de la Vitesse d'Impact des Electrons de Bombardement),
by M. Jean Lecomte. 1964, 5p
Contract N62558 3881
Unclassified report

Pub. in Academie des Sciences, Paris. Comptes Rendus (France) v258 p545-8 1964 (Copies available only to DDC users).

Descriptors: (*Luminescence, Electron bombardment), (*Electron bombardment, Cadmium compounds), (*Cadmium compounds, Sulfides), Velocity, Voltage, Electric currents, Band spectrum, Molecular spectroscopy, Spectra (Visible and ultraviolet).

A study is made of the emission bands in the blue and green parts of the spectrum of cadmium sulfide resulting from bombardment by electrons of varying speed. Also considered is the influence on this spectrum of electron current and voltage.

AD-612 577 Div. 25, 20

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
APPROXIMATE SOLUTION OF A FINITE MANY-PARTICLE SYSTEM WITH TRANSLATIONAL INVARIANCE. I,
by Milton O. Vassell, Sidney Borowitz, and Jerome K. Percus. 22 Jun 64, 14p
Contract Nonr28549; Grant DA ARO D31 124G276
AROD 2360:32
Unclassified report

Pub. in Physical Review (U. S.) v136 n5B pB1266-78 Dec 7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*N-body problem, Numerical analysis), (*Numerical analysis, N-body problem), (*Invariance, N-body problem), Quantum mechanics, Perturbation theory, Nuclear shell models, Dynamics, Center of mass, Hamiltonian, Quantum statistics, Fermions.

A formal technique is developed to study internal properties of finite many-particle systems possessing translational invariance. The basic objective is to discover a method of calculating, in a modified shell model, average values of operators referred to the center of mass, particularly those which have to do with the surface of the system, such as the density of particles. The formalism is based on the method of redundant variables, in which the shell-model wave function describes the internal degrees of freedom of the system, while a superfluous variable is introduced to satisfy the conservation law and to handle the collective motion. The spurious degeneracy which results from the introduction of the extra variable is removed by suitable subsidiary conditions. With the aid of these restricted solutions, it is shown that the density with respect to the center of mass can be calculated in terms of a one-body operator. The dynamics of the system is then formulated in terms of density matrices suitably defined from these restricted solutions. Within the context of the modified shell model, the density matrices consist of the Dirac density matrices of the shell model plus correction terms which depend nonlinearly on these Dirac matrices and matrix elements of the coordinate X. (Author)

AD-612 581 Div. 25, 4

North Carolina Univ., Chapel Hill.
TWO-PHOTON ABSORPTION IN CRYSTALLINE

ANTHRACENE AND NAPHTHALENE EXCITED WITH A XENON FLASH,
by S. Z. Weisz, A. B. Zahlan, J. Gilreath, R. C. Jarnagin, and M. Silver. 21 Jul 64, 5p
Grant DA AROD31 124G60
AROD 3034:12

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n11 p3491-5 Dec 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polycyclic compounds, Fluorescence), (*Fluorescence, Polycyclic compounds), (*Photons, Absorption), Atomic energy levels, Excitation, Crystal lattice defects, Heat treatment, Flash lamps, Xenon.

Two-photon absorption and delayed fluorescence are observed in both anthracene and naphthalene using a 5-microsec xenon flash lamp. It is shown that coherence and monochromaticity are not important in two-photon absorption. It is also demonstrated that the two-photon absorption process does not involve triplet excitons. In anthracene the two-photon rate constant is about 8x10 to the -29 power cm sec and is about this value in naphthalene. Mechanical imperfections play an important role in processes involving excited states in naphthalene mono-crystals. (Author)

AD-612 591 Div. 25, 4

North Carolina Univ., Chapel Hill.
THE THERMODYNAMIC PROPERTIES AND INTERATOMIC POTENTIAL ENERGY OF SOLID ARGON,
by O. K. Rice. 1964, 11p
Grant DA AROD31 124G194
AROD 3091:4

Unclassified report

Pub. in Elisha Mitchell Scientific Society. Journal (U. S.) v80 n2 p120-9 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Argon, Solidified gases), (*Thermal properties, Argon), (*Solidified gases, Argon), Thermodynamics, Equations of state, Energy, Entropy, Enthalpy, Specific heat, Density, Compressive properties, Power series, Cryogenics.

Recent specific heat data for solid argon are integrated to get the entropy and ehthalpy as functions of temperature. From the entropy the Debye characteristic temperature Theta is calculated, the thermal energy is found, and the zero-point energy and potential energy of the solid are calculated. Theta decreases uniformly with temperature. Data on the density of argon are next used to check the Gruneisen equation with good results. The latter equation also gives a fair but not perfect account of the compressibility. Assuming that the Debye theory and the hypothesis of additive pair potential energies are reasonably adequate, the pair-potential energy is obtained by substracting off the potential energy due to other than nearest neighbors. If the pair potential energy is expanded as a power series about its minimum, the Debye Theta can be expressed as a function of the expansion of the solid in terms of the coefficients in this series. These coefficients, evaluated from the behavior of Theta, give a reasonably good, but not perfect, reproduction of the potential energy. Estimates are made of possible errors, particularly those arising from anharmonicity of the vibrations.

AD-612 592 Div. 25

Washington Univ., Seattle.
THE CRYSTAL STRUCTURE OF SODIUM TETRACHLOROFERRATE (III),
by R. Ronald Richards and N. W. Gregory.
20 Jul 64, 6p
Grant DA AROD31 124G61
AROD 2441:13

Unclassified report

Pub. in Journal of Physical Chemistry (U. S.) v69 n1 p239-44 Jan 1965 (Copies not available to DDC or Clearinghouse Customers).

Descriptors: (*Sodium compounds, Complex compounds), (*Crystal structure, Complex compounds), Chlorine compounds, Ferrates, Atomic structure, Thermal properties, X-ray diffraction analysis, Iron compounds.

The crystal structure of NaFeCl4 is found to be orthorhombic, P2 sub 1(2 sub 1)2 sub 1 with unit cell dimensions a sub 0 = 10.304, b sub 0 = 9.880, c sub 0 = 6.235 A. The crystal contains slightly distorted tetrahedral FeCl4 groups; sodium atoms are surrounded by six chlorine atoms at distances between 2.78 and 3.09 A. Bond distances, angles, and packing characteristics are discussed. (Author)

AD-612 612 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Soreq Research Establishment, Israel Atomic Energy Commission, Yavneh.
GENERALIZATION OF THE LYDDANE-SACHS-TELLER RELATION,
by Robert Englman. 15 Aug 64, 8p
Scientific rept. no. SR-1
Contract AF61 052 753

Unclassified report

Descriptors: (*Solids, Dielectric properties), (*Dielectric properties, Solids), (*Perturbation theory, Crystal structure), Israel, Solid state physics, Brillouin zones, Polarization, Ions, Quantum mechanics, Optical properties.

A formula is obtained for the dielectric constant of a solid in terms of the long wavelength transverse and longitudinal frequencies of the optical mode and the percentages of the j th. mode in the resolution of the ionic polarization operator for a thin needle and a slab respectively. The formula is believed justifiable in the face of other results in the literature.

AD-612 613 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Soreq Research Establishment, Israel Atomic Energy Commission, Yavneh.
MICROSCOPIC THEORY OF IONIC DIELECTRICS,
by Robert Englman. 1 Nov 64, 72p
Scientific rept. no. SR-2
Contract AF61 052 753

Unclassified report

Descriptors: (*Dielectrics, Field theory), (*Crystals, Dielectric properties), Thermodynamics, Electrostatics, Ions, Anisotropy, Ferroelectricity, Electrons, Phonons, Dipole moments, Electric fields, Quantum statistics, Israel.

A careful treatment of the Schrodinger equation, including the electron-phonon interaction, for ionic solids leads to the clarification of existing concepts and to the derivation of new results. The work covers the thermodynamic properties, the ordinary dielectric behaviour and the ferroelectric phase of ionic dielectrics. (Author)

AD-612 615 Div. 25, 30
CFSTI Prices: HC$1.00 MF$0.50

Maryland Univ., College Park.
EXPERIMENTAL PROGRAM.
Status rept. for 1 Dec 64-28 Feb 65,
by Hans R. Griem. 28 Feb 65, 6p
Contract Nonr59510

Unclassified report

See also AD-609 998.

Descriptors: (*Atomic spectroscopy, Line spectrum), (*Plasma medium, Ultraviolet radiation), (*Shock waves, Magnetohydrodynamics), (*Probes (Electromagnetic), Plasma physics), Scientific research, Abstracting, Light, Scattering.

Topics include: measurement of Stark broadening of lines from light elements; measurement of the UV radiation from shock-heated plasmas; collisionless plasma shock wave experiment; plasma diagnostics by light scattering; and theoretical program.

AD-612 625 Div. 25, 4
CFSTI Prices: HC$1.00 MF$0.50

Massachusetts Inst. of Tech., Cambridge.
DETERMINATION OF INTERMOLECULAR POTENTIALS FROM MOLECULAR BEAM SCATTERING.
Status rept. no. 22, 1 Oc 64-10 Mar 65,
by I. Amdur, Edward T. Cutler, Michael C. Fowler, John E. Jordan, and Martin S. Longmire. 10 Mar 65, 5p
Contract Nonr184123

Unclassified report

See also AD-437 514.

Descriptors: (*Molecular beams, Scattering), Molecular properties, Electrostatics, Elastic scattering.

Work involving the scattering of molecular beams is briefly summarized.

AD-612 627 Div. 25, 30
CFSTI Prices: HC$1.00 MF$0.50

Syracuse Univ., N. Y. Research Inst.
INTERACTIONS OF ATOMS AND MOLECULES WITH SOLID SURFACES.
Status rept. for 1 Oct 63-31 Mar 64,
by John W. Trischka. 1964, 4p
Contract Nonr66909, Proj. NR014 303

Unclassified report

Descriptors: (*Molecular beams, Instrumentation), (*Vacuum apparatus, Construction), Atomic beams, Solids, Surfaces, Ovens.

A summary is given of work involving the design and construction of apparatus for an experiment with two molecular beams, and the construction of a metal ultra-high vacuum system.

AD-612 638 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Institute of Optics, Univ. of Rochester, N. Y.
ULTRAVIOLET ABSORPTION OF SOLID DEUTERIUM,
by Giancarlo Baldini. 1964, 4p
Grant AF AFOSR236 63
AFOSR 65-0443

Unclassified report

Also included in International Commission for Optics, Conference on Photographic and Spectroscopic Optics, 1-8 Sep 64 held at Tokyo and Kyoto.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Deuterium, Solidified gases), (*Absorption spectrum, Deuterium), (*Ultraviolet spectroscopy, Deuterium), (*Solidified gases, Deuterium), Optical properties, Cryogenics, Impurities, Krypton, Xenon.

In the course of studying the optical properties of the simplest molecular solids in the far ultraviolet, deuterium was investigated and its absorption spectrum is reported here. Rare gas impurities introduced into the solid yield additional information about its electronic and optical properties.

AD-612 639 Div. 25, 30

Johns Hopkins Univ., Baltimore, Md.
SPECTROSCOPIC INSTRUMENTATION FROM THE USER'S POINT OF VIEW,
by G. H. Dieke and D. F. Heath. 1964, 4p
Grant AF AFOSR104 63
AFOSR 65-0446

Unclassified report

Also included in International Commission for Optics, Conference on Photographic and Spectroscopic Optics, 1-8 Sep 64, held at Tokyo and Kyoto
Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Spectrum analyzers, Vacuum), (*Ultraviolet spectrophotometers, Vacuum), Tests, Optical properties, Spectra (Visible and ultraviolet), Oxygen, Hydrogen, Nitrogen.

Experimentation with a 5-meter vacuum Ebert Fastie spectrograph (with the basic design by W. G. Fastie and constructed by the Jarrell-Ash Co.) is reported; the experimentation was into very high resolution, particularly in the vacuum ultraviolet. Orders were separated by an order sorter with cross dispersion: above 2000 A a quartz prism was used and below, a grating with a concave mirror. Both order sorters performed adequately. A 600 000 resolving power was achieved. The spectrograph apparently will give in the vacuum UV above 1000 A a resolution and wave number accuracy obtainable only for the visible and adjacent regions. Except for very special light sources, resolution and wave number accuracy are determined by actual line width rather than by performance of the spectrograph.

AD-612 653 Div. 25, 4
CFSTI Prices: HC$2.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
INFRARED SPECTROSCOPY STUDY OF ORGANOSILICON COMPOUNDS,
by Annette Marchand, Marie-Therese Forel, Franck Metras, and Jacques Valade. Feb 65, 36p RSIC-377
TT 65-61837

Unclassified report

Trans. of Journal de Chimie Physique (France) 1964, v. 61, no. 3, p. 343-362.

Descriptors: (*Siloxanes, Infrared spectroscopy), (*Silanes, Infrared spectroscopy), (*Infrared spectroscopy, Silicon compounds), Silicon compounds, Organic compounds, Theory, Molecular spectroscopy.

Infrared spectra were recorded between 400 and 1600/cm, in the region of 2000/cm, and between 2700/ and 3500/cm for six organic siloxanes R3SiOSiR3, eight organic silazanes R3SiNHSiR3, seven amino- or diaminosilanes without substitution for the nitrogen of R3SiNH2 or R2Si(NH2)2 and for triphenylsilane and diisopropylsilanol (iso-C3H7)2HSiOH. The attributions of the characteristic vibrations of the SiOSi, SiNHSi, SiNH2, Si(NH2)2 and SiH groups, as well as those of the substituents bonded to the silicon: CH3, C2H5, (CH3)2CH, C6H4 and C6H5 are discussed. (Author)

AD-612 654 Div. 25, 15
CFSTI Prices: HC$2.00 MF$0.50

Rhode Island Univ., Kinston.
THE SUPERPOSITION PRINCIPLE AND DIFFRACTION IN ANGULAR SECTORS,
by Julius Kane. Feb 65, 30p
Scientific rept. no. SR-5
Contract AF19 604 7983, Proj. 5635, Task 563502
AFCRL 65-94

Unclassified report

Descriptors: (*Diffraction, Wedges), (*Electromagnetic waves, Propagation), (*Integral transforms, Diffraction), Boundary value problems, Complex variables, Integral equations.

The powerful, but abstruse and complicated procedures used by Peters and Senior to solve diffraction problems in wedge shaped regions are shown to have a simple characterization in terms of the superposition principle. By a generalization of the dual integral equation approach used to analyze Wiener-Hopf problems, integral representations for the solutions of such problems as the scattering of waves in an angular sector with arbitrary mixed boundary conditions imposed on the boundaries of the sector can be readily found. (Author)

AD-612 655 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Clarendon Lab., Univ. of Oxford, (England).
TETRAHEDRAL FERRIC COMPLEXES IN SILVER HALIDES,
by W. Hayes, J. R. Pilbrow, and L. M. Slifkin.
30 Sep 64, 25p Scientific rept. no. SR-5
Contract AF61 052 677
AFCRL 65-120

Unclassified report

Descriptors: (*Silver compounds, Halides), (*Halides, Crystal lattice defects), (*Crystal lattice defects, Impurities), Single crystals, Iron, Halogenation, Chlorides, Bromides, Nuclear magnetic resonance, Line spectrum, Hamiltonian, Atomic orbitals.

Single crystals of AgCl and AgBr which contained iron impurity in the ferrous state were annealed in chlorine and bromine gas at about 350C for approximately one half hour. An investigation by e.s.r. methods, after quenching to room temperature, showed that a portion of the iron impurity was oxidised to the ferric state. The stability of the ferric state at room temperature is dependent on the dislocation content of the crystals. It is suggested that the ferric ions are present interstitially in the crystal forming a complex which may be described as (FeX4)- where X is a halogen; the model in the case of AgCl requires association of the ferric ion with four nearest neighbour silver ion vacancies. (Author)

AD-612 664 Div. 25, 15
CFSTI Prices: HC$2.00 MF$0.50

General Technology Corp., Elgin, Ill.
FINITE DIFFERENCE APPROXIMATION OF THE DEFLECTION EQUATIONS OF A CONICAL SHELL WITH CLOSED BASE,
by J. Heller. Sep 64, 33p
Technical rept. no. TR-1-22
Contract DA11 022ORD2917

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-610 032.

Descriptors: (*Structural shells, Deflection), (*Conical bodies, Structural shells), (*Difference equations, Differential equations), Numerical analysis, Loading (Mechanics), Boundary value problems.

In this report are given finite difference approximations to the differential equations for the following problems: (1) the bending of a variable-thickness truncated right conical shell attached to an axially and sectionally symmetric base plate of variable thickness, (2) the bending of two joined variable-thickness truncated right conical shells. In case (1) above, the terms arising from consideration of the transverse deflection of the base caused by radial loading have been included. As a consequence the finite difference equations are non-linear. For solutions of these equations the author suggests an iterative scheme combined with a direct method based on the factorization theorem for square matrices. In case (2), the finite difference equations are linear and procedures for solution are straightforward.

AD-612 667 Div. 25, 15

Courant Inst. of Mathematical Sciences, New York, N. Y.
SAINT-VENANT'S PROCEDURE AND SAINT-VENANT'S PRINCIPLE,
by Herbert B. Keller. 27 Jan 64, 12p
Grant DA AROD31 124G344
AROD 3069:4

Unclassified report

Pub. in Quarterly of Applied Mathematics (U. S.) v22 n4 p293-304 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Elasticity, Theory), (*Strain (Mechanics), Integral equations), Loading (Mechanics), Stresses.

AD-612 668 Div. 25

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
PROPAGATION OF STRESS DISCONTINUITIES IN INHOMOGENEOUS ELASTIC MEDIA,
by Herbert B. Keller. 8 Jan 64, 28p
AROD 3069:8

Unclassified report

Pub. in SIAM Review (U. S.) v6 n4 p356-82 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stresses, Elasticity), (*Mechanical waves, Propagation), (*Elasticity, Stresses), Continuum mechanics, Differential geometry, Boundary value problems, Wave transmission.

In this paper a theory is derived for the propagation of stress discontinuities in inhomogeneous isotropic media.

The linear theory of elasticity is employed and it is assumed that the stress-strain relation is the usual generalized Hooke's law. To be consistent with the linear theory all displacements must be continuous and this condition is crucial in the present derivation. Of course if the derivatives of the displacements are discontinuous then, by virtue of the stress-strain and strain-displacement relations, the stress field will be discontinuous. It is the propagation of such discontinuities that is considered.

AD-612 678 Div. 25, 15
CFSTI Prices: HC$1.00 MF$0.50

Oregon Univ., Eugene.
OBSERVATIONS ON THE SPHERICAL MODEL OF A FERROMAGNET,
by C. C. Yan and G. H. Wannier. 1964, 21p
Technical rept. no. TR-5
Contract Nonr277105, Proj. NR017 633
Unclassified report

Descriptors: (*Ferromagnetic materials, Mathematical models), (*Statistical mechanics, Ferromagnetism), Statistical distributions, Probability, Spin, Integration, Thermodynamics.

A discrepancy between the methods of the grand and the canonical ensemble which arose in the study of the spherical model of a ferromagnet even for properties of individual spins is traced to an incorrect order of taking limits. The spin system must be considered for a small but not vanishing field first, and the limit of zero field must only be taken after the limit of an infinite number of particles has been taken. For this case no discrepancy between the two ensembles arises. A calculation proceeding entirely at zero field cannot be considered as logically admissible; discrepancies arising in this case are thus of no physical consequence. (Author)

AD-612 680 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Poulter Research Labs., Stanford Research Inst., Menlo Park, Calif.
DYNAMIC BUCKLING OF A THIN CYLINDRICAL SHELL UNDER AXIAL IMPACT,
by H. E. Lindberg and R. E. Herbert. 2 Feb 65, 32p Technical rept. no. TR-001-65
Contract AF29 601 6360 Unclassified report

Descriptors: (*Structural shells, Buckling (Mechanics)), (*Cylindrical bodies, Buckling (Mechanics)), (*Buckling (Mechanics), Impact shock), Deflection, Deformation, Thrust, Failure (Mechanics), High-speed photography, Theory.

Buckling of thin cylindrical shells from axial impact is studied under the assumption that initial imperfections can be approximated by 'white noise'. Linear small deflection theory is used to calculate the resulting growth of the normal modes and a statistical analysis gives the expected values for the 'preferred' axial and circumferential wavelengths. Very high-speed photographs (240,000 frames/sec) of shells buckling under axial impact show excellent agreement with the theory and demonstrate that large deflection buckling follows the pattern established by the early linear motion. (Author)

AD-612 692 Div. 25, 8
CFSTI Prices: HC$2.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
PLANE WAVE PROPAGATION IN A NONLINEAR, INHOMOGENEOUS, TIME-DEPENDENT PLASMA MEDIUM.
Scientific rept.,
by R. J. Papa. Jan 65, 48p AFCRL 65-51, PSRP-76
Proj. 4642, Tsk 464202
See also AD-601 669. Unclassified report

Descriptors: (*Radio waves, Propagation), (*Plasma medium, Radio waves), Anisotropy, Magnetic fields, Electron, Energy, Temperature, Density, Numerical analysis, Tensor analysis, Harmonic analysis, Conductivity.

Numerical solutions to the energy balance equation and continuity equation have been obtained for the electron gas representing the nonlinear interaction of a radio-frequency plane wave with a time-varying and spatially varying electron density profile. Graphs are presented which depict the time-dependent response of the electron density and electron temperature when the inhomogeneous plasma is subjected to a monochromatic, radio-frequency plane wave. The interaction with a plasma medium is extended to the anisotropic case. An elliptically polarized plane wave incident upon an electron density profile induces changes in the electron temperature and electron density. A dc magnetic field parallel to the electron density gradients causes the elliptically polarized wave to split into two distinct modes, right and left circularly polarized modes, which are coupled through an energy balance equation for the electron gas that governs the electron temperature. The time-dependent response of the plasma is found by numerically integrating an energy balance equation and a continuity equation. The wave field in the time-dependent, anisotropic medium is expressed as a superposition of a right and left circularly polarized mode The solution to the wave equation is obtained through the use of the WKB approximation. (Author)

AD-612 705 Div. 25
CFSTI Prices: HC$4.00 MF$1.00

Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
RESEARCH AND DEVELOPMENT FOR SEMICONDUCTOR SURFACE CONTROL AND STABILIZATION.
Scientific rept. no. 2, Sep-Nov 64,
by K. D. Kang, B. Van Pul, and J. Adamic. 14 Nov 64, 147p
Contract AF19 628 3808, Proj. 4608, Task 460805
AFCRL 65-27 Unclassified report

Descriptors: (*Semiconductors, Surface properties), Transistors, Stability, Degradation, Metals, Electron transitions, Atomic energy levels, Silicon compounds, Oxides, Films, Crystal lattice defects, Boron compounds, Phosphorus compounds, Glass, Gold, Silicon, Germanium, Impurities, Stabilization, Semiconductor devices, Contamination.

The report covers work performed during the reporting period in the following areas: metal oxide semiconductor (insulated gate) field effect transistor instability and degradation, the behavior of thermally grown silicon oxide passivating layers, the discovery of interface dislocations in passivated silicon structures, the effect of boron and phosphorus glasses on the distribution of gold in silicon, the effect of wafer processing on gold distribution near silicon-silicon dioxide interfaces, the comparison of glasses on passivated transistors manufactured by different companies and germanium planar transistor investigation. (Author)

AD-612 707 Div. 25, 14
CFSTI Prices: HC$4.00 MF$1.00

Raytheon Co., Waltham, Mass. Research Div.

INVESTIGATION OF CERTAIN BASIC PROBLEMS IN SOLID STATE AND GASEOUS OPTICAL MASERS.
Final rept. for 1 Dec 63-30 Sep 64,
by C. Tang. Nov 64, 134p Rept. no. S-702
Contract AF19 628 3862, Proj. 4645, Task 464502
AFCRL 64-946

Unclassified report

Descriptors: (*Lasers, Materials), (*Semiconductors, Lasers), (*Gases, Lasers), Masers, Crystals, Ruby, Calcium compounds, Tungsten compounds, Oxygen compounds, Neodymium, Optics, Raman spectroscopy, Theory, Experimental data.

This report gives results of an experimental and theoretical investigation of the spectral and transient characteristics of solid-state and semiconductor lasers and also a theoretical study of the nonlinear interaction of coherent lightwaves due to the higher order coherent Raman effects. It includes also a description of the detailed results obtained in a successful attempt at improving both the output spectra and the spiking characteristics of ruby and CaWO4:Nd(3+) lasers and some preliminary experimental results of higher order coherent Raman processes confirming that volume amplification of coherent lightwaves via the Raman processes have been observed.

AD-612 713 Div. 25, 17
CFSTI Prices: HC$1.00 MF$0.50

Institute for the Study of Fatigue and Reliability, Columbia Univ., New York.
DIFFERENCES IN FATIGUE BEHAVIOR OF SINGLE COPPER CRYSTALS AND POLYCRYSTALLINE COPPER AT ELEVATED TEMPERATURES,
by W. A. Wood and H. D. Nine. Feb 65, 24p
Technical rept. no. TR-15
Contract Nonr26691, Proj. NR064 470

Unclassified report

Descriptors: (*Copper, Fatigue (Mechanics)), (*Fatigue (Mechanics), Copper), (*Crystallography, Copper), High-temperature research, Microstructure, Deformation, Single crystals, Grain boundaries, Recrystallization, Fracture (Mechanics), Crystal lattice defects.

A comparison is made of the microstructural changes occurring in annealed polycrystalline copper and in single copper-crystals when subjected similarly to fatigue deformation by alternating torsion at temperatures ranging from room temperature to 400C. The amplitudes of cyclic strain in each case were purposely chosen to be typical of those which at room temperature produce fatigue damage by the concentrating of slip in bands which finally turn into slip-zone microcracks. It is shown that this slip concentration in polycrystalline copper no longer occurs as the test temperature is raised and that fatigue damage instead concentrates at grain boundaries. Also the slip concentration ceases in single-crystal copper as the test temperature is raised but in this case, where there are no grain boundaries, the metal recrystallizes and becomes polycrystalline before fracture. It is shown further that whereas the fatigue life of polycrystalline copper decreases with increasing temperature that of the single-crystal copper remains unaltered. (Author)

AD-612 715 Div. 25, 4
CFSTI Prices: HC$1.00 MF$0.50

Institute of Optics, Univ. of Rochester, N. Y.

OPTICAL PROPERTIES OF SOLID RARE GASES AND THEIR ALLOYS.
Technical note,
by G. Baldini. Aug 64, 19p
Grant AF AFOSR236 63

Unclassified report

Invited paper presented at the 1964 Spring Meeting of the American Physical Society, Philadelphia.

Descriptors: (*Helium group gases, Solidified gases), (*Optical properties, Helium group gases), (*Solidified gases, Helium group gases), Cryogenics, Molecules, Crystal structure, Excitation, Absorption spectrum, Electric insulation, Photoconductivity, Crystal lattices.

The theory of excited states in insulators is outlined, the optical absorption spectra of the solid rare gases shown and the experimental results discussed in the light of available theoretical models.

AD-612 725 Div. 25, 8, 30
CFSTI Prices: HC$7.00 MF$1.75

Perkin-Elmer Corp., Norwalk, Conn.
INVESTIGATION OF TECHNIQUES FOR MODULATING AND SCANNING A LASER BEAM TO FORM A VISUAL DISPLAY.
Final rept. for Jun 63-Jun 64,
by Paul R. Yoder. Jan 65, 353p
Engineering rept. no. ER-7600
Contract AF30 602 3122, Proj. 5578, Task 557803
RADC TDR-64-365

Unclassified report

Descriptors: (*Lasers, Display systems), (*Display systems, Lasers), (*Electron optics, Lasers), Light, Video signals, Modulation, Deflection, Modulators, Crystals, Potassium compounds, Hydrogen compounds, Phosphates, Optical scanning, Mirrors, Barium compounds, Titanates, Synchronization (Electronics), Light communication systems.

Various techniques whic might be used to modulate and deflect a laser beam in response to an input video signal so as to form a projected visual display containing 1,000,000 resolved information bits at 30 frames per second are considered in this report. Electro-optical modulation techniques are evaluated in general and the Pockel cell using potassium dihydrogen phosphate is considered in detail. Slow scanning of the beam at 30 cycles per second is found to be feasible using a piezo-electrically driven nodding mirror scanner. Several fast scanning techniques are investigated theoretically and one type device using a prism of barium titanate electro-optically active crystalline material is also evaluated experimentally. Brief consideration of photo-metric and synchronization aspects of laser display systems indicates no particular problem areas to be resolved in development of actual hardware systems.

AD-612 745 Div. 25, 14

Hebrew Univ., Jerusalem (Israel).
TRANSIENT SPACE-CHARGE-LIMITED PHOTO-CURRENTS IN ANTHRACENE,
by A. Many, S. Z. Weisz, and M. Simhony.
20 Nov 61, 4p
Grant DA ARO D31 124 G60
AROD 3034:11

Unclassified report

Pub. in Physics and Chemistry of Solids (U. S.) v23 p419-22 1962 (Copies available only to DDC users).

Descriptors: (*Polycylic compounds, Photoelectric effect), (*Photoelectric effect, Polycyclic compounds), Space charges, Transients, Photoelectric cells (Semiconductor), Ultraviolet radiation, Israel.

The note is a report on the preliminary investigation of transient space-charge-limited photocurrents in anthracene. These currents arise from the drift of carriers generated at one electrode of a sandwich-type cell by a highly absorbed, intense, short flash of ultraviolet light. It is shown that unless space-charge effects, when present, are properly taken into account, the interpretation of the observed transient photocurrent may well lead to erroneous conclusions. This is particularly the case when trapping characteristics are deduced from these observations.

AD-612 749 Div. 25, 2, 4

Queen's Univ., Belfast (Northern Ireland).
RECOMBINATION OF POSITIVE IONS AND ELECTRONS IN A DENSE NEUTRAL GAS,
by D. R. Bates and S. P. Khare. 13 Oct 64, 14p
Contract N62558 3634

Unclassified report

Pub. in Physical Society. Proceedings (Gt. Brit.) v85 p231-43 1965 (Copies available only to DDC users).

Descriptors: (*Ions, Recombination reactions), (*Electrons, Recombination reactions), (*Recombination reactions, Theory), Plasma medium, Helium, Reaction kinetics, Atomic energy levels, Lithium, Sodium, Potassium, Great Britain.

A theory is presented of the recombination of electrons and positive ions in the presence of neutral atoms which act as third bodies, explicit account being taken of the effect of radiative transitions. Comparison is made with the theories of Thomson and of Pitaevskii. Detailed calculations are carried out on recombination in helium gas. It is found that the rate coefficient is very great when the temperature is low and the number density N(He) is high. (Author)

AD-612 750 Div. 25, 17

Purdue Univ., Lafayette, Ind.
SPECIFIC HEAT OF LEAD AND LEAD ALLOYS BETWEEN 0.4 AND 4.2K,
by B. J. C. van der Hoeven, Jr. and P. H. Keesom.
10 Aug 64, 5p
AROD 3655:4

Unclassified report

Pub. in Physical Review (U. S.) v137 n1A pA103-7 Jan 4 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Specific heat, Lead), (*Lead, Specific heat), (*Lead alloys, Specific heat), (*Cryogenics, Lead), Indium alloys, Superconductivity, Atomic energy levels, Anisotropy, Measurement, Equations of state.

The specific heat of a pure single crystal and a pure polycrystalline sample of lead has been measured between 0.4 and 4.2K. For the coefficient of the normal-state electronic term alpha, a value of (3.00±0.01) mJ/mole sq deg is found. The value for the Debye parameter at 0K, is (105.4±0.8)K. Below 1.5K, the superconducting-state specific heat C sub s could be represented by a T(3) law, with a slope 5% larger than that of the normal-state specific heat C sub n. As a result, below 1.5K the superconducting-state electronic specific heat C sub es followed a T(3) law, in disagreement with the exponential behavior predicted by the Bardeen-Cooper-Schrieffer theory. In an effort to investigate the anomalously large values of C sub es, two samples of lead alloyed with 1.76% indium and 5.93% indium were measured. For the 1.76% In sample the anomaly persists, but it disappears for the 5.93% In sample. Tentatively it can be concluded that energy-gap anisotropy is able to explain the lead results. (Author)

AD-612 751 Div. 25, 17

Purdue Univ., Lafayette, Ind.
MIXED-STATE SPECIFIC HEAT OF VANADIUM AT VERY LOW TEMPERATURES,
by P. H. Keesom and Ray Radebaugh. 21 Oct 64, 2p
AROD 3655:17

Unclassified report

Pub. in Physical Review Letters (U. S.) v13 n23 pV516 1-2,2-2 Dec 7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Specific heat, Vanadium), (*Vanadium, Specific heat), (*Crogenics, Vanadium), Equation of state, Superconductivity.

The specific heat of pure vanadium in the superconductive, normal and mixed states was measured. The equations of state are presented.

AD-612 753 Div. 25, 15

New York State Univ., Buffalo.
ATOMIC DIPOLE POLARIZABILITIES FROM THE UNCOUPLED HARTREE-FOCK APPROXIMATION. Revised ed.,
by M. Yoshimine and R. P. Hurst. 19 Dec 63, 6p
Grant AF AFOSR191 63
AFOSR 65-0402

Unclassified report

Pub. in Physical Review (U. S.) v135 n3A pA612-7 Aug 3 1964 (Copies not available to DDC or Clearinghouse customers)
Revision of rept. dated 19 Dec 63.

Descriptors: (*Atomic orbitals, Dipole moments), (*Dipole moments, Polarization), (*Atomic energy levels, Numerical analysis), Atomic charge, Perturbation theory, Calculus of variations, Hamiltonian, Helium group gases, Atomic structure, Electric fields.

Electric dipole polarizabilities are computed for a large number of 2-, 3-, 4-, 10-, 11-, 12-, 18-, 19-, and 20-electron atoms and ions. These results are all obtained within the framework of the uncoupled Hartree-Fock approximation. All calculations are made using analytical Hartree-Fock wave functions. For the lighter atoms and positive ions the results of these calculations are in fairly good agreement with the experimental and other more accurate theoretical values. However, for the heavier atoms and ions the results are too large. It is also found that great care must be exerted in selecting self-consistent functions for use in making polarizability calculations. (Author)

AD-612 754 Div. 25, 15

Illinois Univ., Urbana. Dept. of Physics.
MOBILITY OF THE LEE-LOW-PINES POLARON,

by David C. Langreth. 25 Jun 64, 5p
Contract DA31 124AROD114
AROD 431: 67

Unclassified report

Pub. in Physical Review (U. S.) v137 n3A pA760-4 Feb 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrons, Crystal lattices), (*Crystal lattices, Polarization), (*Motion, Electrons), Phonons, Scattering, S-matrix, Perturbation theory, Power series, Conductivity, Green's function.

The Low-Pines polaron mobility calculation is discussed. It is pointed out that the optical theorem provides an alternative method for evaluating the mobility from the Low-Pines scattering matrix. The application of this method leads to the mobility formula mu=(e/2 alpha N omega m)f(a), where f(a) is the slowly varying function calculated by Low and Pines. A sample calculation is performed to illustrate why the above formula is to be preferred. The above modification of the original Low-Pines formula not only agrees with perturbation theory to order a(o), but is also in fair agreement with Osaka's Feynman-model calculation for a<3. (Author)

AD-612 755 Div. 25

Illinois Univ., Urbana.
MOTION OF QUANTIZED FLUX LINES IN SUPERCONDUCTORS,
by J. Bardeen. 19 Oct 64, 2p
Contract DA31 124ARO D114
AROD 431:65

Unclassified report

Pub. in Physical Review Letters (U. S.) v13 n25 p747-8 Dec 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Superconductors, Electric fields), (*Electric fields, Motion), Electric currents, Magnus force, Drag, Magnetic fields.

AD-612 762 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
THE EFFECTS OF UNEQUAL RADIATION LOADS ON THE UNIDIRECTIONAL PROPERTIES OF A 36-ELEMENT BIPLANAR ARRAY OF ACOUSTIC PROJECTORS.
Interim rept.,
by M. A. Blizard. 3 Mar 65, 23p Rept. no. NRL-6207
Proj. RF001 03 44 4052

Unclassified report

Descriptors: (*Acoustics, Transducers), (*Transducers, Acoustics), Acoustic equipment, Mathematical models, Sound transmission, Mathematical analysis, Digital computers.

A mathematical model was derived of a 36-element, biplanar array of variable-reluctance, two-mass, quasi-dipole, acoustic projectors. It was assumed that mutual interactions and scattering may be neglected and that all projectors in the same plane have the same acoustic load. Various projector element properties and array properties were computed with the aid of an electronic digital computer as a function of frequency and several combinations of acoustic radiation loading and 'arbitrary' conditions. The model illustrates the alteration of the unidirectional radiation of the array as a consequence of unequal radiation loads on the two planes. The model also indicates a limited improvement in the unidirectional radiation due to the addition of tuning capacitors in series with the individual projectors.

AD-612 773 Div. 25, 2, 6, 8, 12, 30
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 3. RADIO PHYSICS.
Quarterly progress rept. for 1 Nov 64-31 Jan 65,
by J. W. Meyer. 15 Feb 65, 14p
Contract AF19 628 500
ESD TDR-65-50

Unclassified report

See also AD-425 670.

Descriptors: (*Physics, Research program administration), Radio astronomy, Radar equipment, Radiometers, Radar tracking, Radomes, Radar antennas, Solar radiation, Propagation, Ionosphere, Venus, Mercury, Satellites (Artificial), Space surveillance systems.

Contents: Space Surveillance, Radio and Radar Astronomy, Ionospheric Studies, Station Equipment and Improvements, Solar Radar Studies, Propagation Studies.

AD-612 778 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Polytechnic Inst. of Brooklyn, N. Y.
TORSIONAL WAVES IN COMPOSITE RODS.
Research rept.,
by Anthony E. Armenakas. Jan 65, 33p
Rept. no. PIBAL-699
Contract Nonr83917FBM, Proj. NR064 427

Unclassified report

Descriptors: (*Rods, Mechanical waves), (*Mechanical waves, Rods), (*Composite materials, Rods), Elasticity, Theory, Torsion bars, Iterative methods, Frequency, Equations, Numerical analysis, Three-dimensional flow.

The propagation of torsional waves in composite, infinitely long, traction-free, circular, cylindrical rods is investigated on the basis of the three-dimensional linear theory of elasticity. The composite rods consist of an internal circular rod made of one material, bounded by, and bonded to, a circular casing made of another material. The effect of the variation of the geometric and physical parameters on the frequency of the torsional motion is discussed. It is shown that for composite rods, in general, the first torsional mode (no nodes along the radius) may not exist uncoupled. (Author)

AD-612 787 Div. 25, 15
CFSTI Prices: HC$3.00 MF$0.75

Rensselaer Polytechnic Inst., Troy, N. Y.
THERMODYNAMICS.
Final rept.,
by B. R. Onuf and J. W. Bursik. Jun 63,
66p Rept. no. TR-AE-6303
Grant DA TC44 177G6, Proj. 9R99 20 001 01

Unclassified report

Descriptors: (*Thermodynamics, Phase studies), (*Phase studies, Thermodynamics), Equations of state, Vaporization, Gases, Liquids, Differential equations, Reports.

CONTENTS: Correlation of Thermodynamic Two Phase Data; Thermodynamic Derivatives; Envelopes in Two Phase Regions; Other Areas of Investigation.

AD-612 788 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
CRITERIA FOR THE VALIDITY OF LOCAL THERMODYNAMIC EQUILIBRIUM,
by D. H. Sampson. Dec 64, 28p Rept. no. R64SD90
Contract DA28 017AMC595A
Unclassified report

Descriptors: (*Gas ionization, Thermodynamics), (*Thermodynamics, Gas ionization), Atomic energy levels, Excitation, Electrons, Temperature, Density, Ionization potential, Plasma medium.

With the use of the Seaton formulae for the collisional excitation and ionization cross sections, a simple equation is obtained giving the relation between the electron temperature T, electron density Ne and the ionization energy, required for a gas to be collision dominated. Then with the use of an approximate equation expressing the ionization energy, in terms of T and Ne, an approximate general equation giving the relation between T and Ne necessary for all elements to be collision dominated is obtained. It is seen that at high temperatures very high electron densities are required for high Z elements to be collision dominated. The additional requirements for a non-optically thin gas to be in local thermodynamic equilibrium (LTE) and the conditions for an optically thick gas to be in LTE are also briefly discussed. (Author)

AD-612 806 Div. 25, 2, 4
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
ELECTRON RETARDING POTENTIAL MEASUREMENTS ON CO2, N2O AND NO2,
by Richard I. Schoen. Feb 65, 31p D1-82-0406
Unclassified report

Also available from the author.

Descriptors: (*Gas ionization, Atomic energy levels), (*Carbon dioxide, Gas ionization), (*Nitrogen compounds, Oxides), Upper atmosphere, Photochemistry, Polyatomic molecules, Photons, Argon, Excitation.

Electron retarding potential curves were obtained from the gases CO2, N2O and NO2 from which estimates were made of several appearance potentials which lie in the ionization continua of each of the gases. Evidence is present in the cases of CO2 of autoionization and in the cases of NO2 and N2O of dissociative ionization. Refinement of the method to the point at which clear evidence of vibrational excitation can be seen is needed. (Author)

AD-612 810 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Parke Mathematical Labs., Inc., Carlisle, Mass.
THERMAL EFFECTS IN RADIATION DAMAGE EXPERIMENTS,
by Charles H. Sherman. ct 64, 44p
Scientific rept. no. SR-4, 2419-SR-4
Contract AF19 628 2419, Proj. 5620, Task 56002
AFCRL 64-935
Unclassified report

Descriptors: (*Electron bombardment, Metals), (*Resistance (Electrical), Cryogenics), Platinum, Thermal conductivity, Electron beams, Energy, Absorption, Partial differential equations, Boundary value problems, Density, Numerical analysis.

A rather rigorous calculation of the one-dimensional steady state temperature distribution in a radiation damage test strip is described. The analysis includes the temperature dependence and specimen dependence of the thermal conductivity, as well as the effect of radiation damage on the thermal conductivity. The thermal calculations are used to determine the electrical resistance of the sample during the irradiation, and various uses for such calculations in interpreting experimental data are discussed. Numerical illustrations are carried out for a platinum sample. (Author)

AD-612 812 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

National Bureau of Standards, Washington, D. C.
PROCEDURES FOR PRECISE DETERMINATION OF THERMAL RADIATION PROPERTIES.
Rept. for 1 Nov 62-31 Oct 63,
by J. C. Richmond, D. P. DeWitt, and W. D. Hayes, Jr.
Jan 65, 62p Technical note TN-252
Contract AF33 616 61 02, Proj. 7381, Task 738103
ML TDR-64-257
Unclassified report

Descriptors: (*Thermal radiation, Determination), (*Reflectometers, Design), (*Spectroscopy, Emissivity), Lasers, Gas discharges, Helium, Neon, Mirrors, Platinum, Rhodium, Spheres, Temperature, Standards.

The preliminary design of an integrating-sphere reflectometer, utilizing a helium-neon continuous-wave gas laser as the source, for measuring the reflectance of specimens at high temperature, was completed. Development work on an ellipsoidal mirror reflectometer for measuring spectral reflectance in the wavelength range of 2 to 15 microns of specimens at room temperature was continued. The study of equations relating spectral emissivity of metals to other properties was continued. Platinum-13% rhodium and oxidized Inconel working standards of normal spectral emittance were calibrated over the wavelength range of 1 to 15 microns at temperatures of 800, 1100 and 1300 degrees K. Several modifications of the normal spectral emittance equipment were made to permit operation in the 15-35 micron range. (Author)

AD-612 813 Div. 25, 9
CFSTI Prices: HC$6.00 MF$1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ALL-UNION CONGRESS ON THEORETICAL AND APPLIED MECHANICS (NO. 2) MOSCOW, 29 JAN-5 FEB 64 (ABSTRACTS OF PAPERS),
ed. by G. K. Mikhailov. 30 Jul 64, 285p
FTD-MT-64-207
TT 65-61844
Unclassified report

Edited machine trans. of mono. Vsesoyuznyi S'ezd po Teoreticheskoi i Prikladnoi Mekhanike (no. 2) Moscow, 29 Jan-5 Feb 64. Annotatsii Dokladov, 1964, 246p. See also TT-64-30085 through TT-64-30088.

Descriptors: (*Mechanics, Symposia), (*USSR, Symposia), Solids, Fluid mechanics, Gas flow, Motion, Celestial mechanics, Vibration, Control, Gyroscopes, Teaching machines, Fluid dynamic properties, Plasma, Plasticity, Elasticity, Creep, Soil mechanics, Hydrodynamics, Abstracting.

The sessions of the conference were held in 3 sections: section of general and applied mechanics; section of fluid and gas mechanics; section of mechanics of solids.

AD-612 819 Div. 25, 8

Air Force Cambridge Research Labs., Bedford, Mass.
HARMONIC GENERATION OF MICROWAVE PHONONS IN QUARTZ,
by Paul H. Carr. 26 Jun 64, 10p
AFCRL 64-955, PSRP-69
Proj. 4600

Unclassified report

Pub. in Physical Review Letters (U. S.) v13 n10 p332-5 Sep 7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Microwave generators, Piezoelectric crystals), (*Phonons, Microwave frequency), Quartz, Piezoelectric effect, Harmonic analysis, Cryogenics.

It was previously demonstrated that microwave phonons can be generated by the piezoelectric effect at the end surface of quartz placed in the electric field of a re-entrant cavity. It is now shown that second and third harmonics of the fundamental microwave frequency are also generated.

AD-612 828 Div. 25

Institute of Tech., Univ. of Minnesota, Minneapolis.
ELECTRON MICROSCOPIC STUDY OF PRECIPITATES AND DEFECTS IN GERMANIUM AND SILICON.
Revised ed.,
by R. D. Weltzin, R. A. Swalin, and T. E. Hutchinson. 15 Jun 64, 10p Technical rept. no. TR-6
Contract Nonr71027

Unclassified report

Pub. in Acta Metallurgica (U. S.) v13 p115-23 Feb 1965 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 23 Mar 64.

Descriptors: (*Germanium, Crystal lattice defects), (*Silicon, Crystal lattice defects), (*Lithium, Diffusion), Electron microscopy, Impurities, Particles, Solid solutions, Density, Pose studies.

The precipitate particles and defects formed during precipitation of lithium from solid solution in germanium and silicon have been studied by transmission electron microscopy. Kinetic studies on the same systems have been reported previously. From the microscopic investigation, it has been determined that the precipitate particles in germanium are spherical, maintain a coherent interface with the parent phase, and are randomly distributed. The experimental evidence obtained from microscopy has been interpreted through the application of the theoretical work of Ashby and Brown on diffraction contrast of coherent, spherical precipitate particles. Various contrast effects in silicon have been noted. The number density of precipitate particles in germanium has been determined from electron micrographs. This number density has been compared to the number density obtained from precipitation experiments on the same sample, the precipitation number density determined using the theory of Ham on diffusion limited precipitation for spherical precipitate particles. The agreement is found to be quite good, covering a range of number densities 8 x 10 to the 11th power cu cm to approximately 10 to the 14th power cu cm. (Author)

AD-612 831 Div. 25

Pennsylvania State Univ., University Park.
MEASUREMENT OF THE ENERGY DISTRIBUTION IN FIELD IONIZATION.
Technical rept.,
by Tien Tzou Tsong and Erwin W. Muller. 6 Aug 64, 7p
Contract Nonr65623, Proj. NR017 443

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n11 p3279-84 Dec 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Field emission, Gas ionization), (*Energy, Distribution), (*Gas ionization, Field emission), Field theory, Ionization potentials, Helium group gases, Hydrogen, Atomic energy levels, Test methods, Laboratory equipment.

The energy distribution of ions obtained by field ionization of He, Ne, Ar, and H2 near the surface of a tungsten emitter is measured with an improved retarding potential tube. Most ions are found to originate immediately beyond the critical distance determined by the condition that the electron tunnels above the Fermi level. The ion energy is determined by the ionization energy and an image force contribution, while there is no indication of a shift of the ground level of the gas atom due to the proximity of the metal surface. In the case of hydrogen the atomic ion is found to have an additional energy of 1/2 of the dissociation energy of the molecular ion. The half-width of the distribution is between 0.5 and 0.7 eV for all the above gases, indicating an extremely narrow ionization zone with a depth of a few tenths of an angstrom. Calculation of the energy distribution by applying the WKB method to a square well gives the proper general features and the temperature effect but a half-width too wide by a factor of 2, thereby exhibiting the limitation of a linear model. (Author)

AD-612 838 Div. 25

David Taylor Model Basin, Washington, D. C.
SOUND RADIATION FROM VIBRATING SURFACES,
by George Chertock. 29 Aug 63, 11p
Rept. no. 1873
Projs. S F013 11 08, S F011 01 01

Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n7 p1305-13 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sound, Vibration), (*Surfaces, Vibration), Pressure, Spheres, Integral equations, Numerical analysis, Acoustics.

The radiation field of a body vibrating with a specified distribution of velocity on the surface may be computed from the Helmholtz integral if the pressure distribution on the surface is known. In special cases of low frequency, high frequency, or particular surface shapes, it is possible to estimate the surface pressures with sufficient accuracy and thus reduce the calculation of the field pressure to a simple quadrature over the surface. In more-general cases, the surface pressure may be calculated by numerical solution of a Fredholm integral equation. This solution is described in detail for the special case of a surface of revolution with an arbitrary velocity distribution and frequency. The numerical solutions are illustrated by particular examples and compared with exact analyses. (Author)

AD-612 844 Div. 25, 8

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SEMICONDUCTOR MASERS,
by Benjamin Lax. 1964, 13p MS-779 Unclassified report

Pub. in mono. Proceedings of the Symposium on Optical Masers, Brooklyn, N. Y., 16-19 Apr 63, p119-30.

Descriptors: (*Semiconductors, Masers), (*Masers, Semiconductors), Diodes (Semiconductor), Gallium alloys, Arsenic alloys, Impurities, Electron transitions, Pumping (Electronics), Electric currents, Cyclotron resonance phenomena, Magneto-optic effect, Electromagnetism, Quantum mechanics.

Various schemes for achieving maser action in semiconductors have been proposed. These include a variety of phenomena involving transitions between impurity levels, interband transitions and those between magnetic levels. To date, the only successful semiconductor maser has been the electrically pumped p-n junction diode of GaAs and related compounds. The operation and theory of this device will be described in detail. The present status of the other semiconductor masers, such as the cyclotron resonance, the magneto-optical, the indirect transition masers and others will be reviewed. (Author)

AD-612 845 Div. 25, 15, 20

Polytechnic Inst. of Brooklyn, N. Y.
REPRESENTATIONS OF THE INHOMOGENEOUS LORENTZ GROUP IN TERMS OF AN ANGULAR MOMENTUM BASIS: DERIVATION FOR THE CASES OF NONZERO MASS AND ZERO MASS, DISCRETE SPIN,
by J. S. Lomont and H. E. Moses. 21 May 64, 20p
Unclassified report

Pub. in Journal of Mathematical Physics (U. S.) v5 n10 p1438-57 Oct 1964 (Copies not available to DDC or Clearinghouse customers)
Prepared in cooperation with Lincoln Lab., Mass. Inst. of Tech., Lexington.

Descriptors: (*Elementary particles, Groups (Mathematics)), (*Groups (Mathematics), Momentum), Nuclear spins, Operators (Mathematics), Vector analysis, Matrix algebra, Quantum statistics.

In a previous paper (J. Math. Phys. 5:294, 1964) it was shown how the infinitesimal generators of the proper, orthochronous, inhomogeneous Lorentz group acted in a basis in which the square of the angular momentum, the z component of the angular momentum, the helicity and the energy were diagonal for the irreducible representations which correspond to the cases of nonzero and zero mass, discrete spin. In that paper no derivation of the results were given. It was possible, however, to verify them directly. In the present paper the derivation is carried out. (Author)

AD-612 847 Div. 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ASPHERICAL SPIN DENSITY IN S-STATE CATIONS,
by T. A. Kaplan. 18 Jun 64, 5p
Unclassified report

Pub. in Physical Review (U. S.) v136 n6A pA1636-40 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Crystal lattices, Nuclear spins), (*Nuclear spins, Density), (*Antiferromagnetism, Nuclear spins), (*Iron compounds, Oxides), Ions, Atomic orbitals, Atomic energy levels, Ferromagnetism, Neutron scattering, Quantum statistics.

A calculation of the first-order effect of spin-orbit coupling on a (3d)(5) unperturbed S-state ion in a cubic crystal field has led to a new contribution sigma-1 (r) to the ionic spin density. The integral over space of sigma-1 (r) is zero and sigma-1 (r) is perpendicular to the unperturbed spin density sigma-0 (r); while sigma-0 (r) is spherically symmetric about the nucleus, sigma-1 (r) is highly aspherical. In alpha-Fe2O3 at room temperature, the spin density consists of the large "antiferromagnetic" component sigma-0, plus the new term sigma-1, plus the weak ferromagnetic or Dzialoshinsky term sigma-D, which is spherical. In neutron scattering, it is found that sigma-1 contributes to the same "ferromagnetic" Bragg peaks as does sigma-D, and in the same order of magnitude. Hence the new term is probably important for understanding the surprising, highly aspherical ferromagnetic spin-density distribution recently observed in alpha-Fe2O3 by Pickart, Nathans, and Halperin. In general, sigma-1 (r) will be nonzero under much less restrictive symmetry requirements than those needed for the nonvanishing of sigma-D. In the course of discussion, it is pointed out that the Dzialoshinsky-Moriya theory of the weak ferromagnetism in alpha-Fe2O3, for example, implies that the application of a spatially uniform magnetic field should influence the distribution of domains of antiferromagnetic spin components. This effect was observed by Pickart et al. (Author)

AD-612 849 Div. 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ULTRASONICS,
by J. J. G. McCue. 1964, 2p
Unclassified report

Pub. in Science (U. S.) v147 n3655 p309-10 Jan 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ultrasonic radiation, Scientific research), Ultrasonic properties, Sound transmission, Thermodynamics, Test equipment, Spectrum analyzers, Amplifiers, Medical equipment.

AD-612 855 Div. 25

Massachusetts Inst. of Tech., Cambridge.
SOME EXACT SOLUTIONS OF MAGNETO-HYDRODYNAMIC VISCOUS FLOW PROBLEMS,
by H. P. Greenspan and L. A. Peletier. 30 Nov 61, 17p
Contract AF49 638 708
AFOSR 3144
Unclassified report

Pub. in Journal of Mathematics and Physics (U. S.) v41 n2 p116-31 Jun 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetohydrodynamics, Mathematical analysis), Fluids, Electrical conductance, Electric fields, Propagation, Diffusion, Oscillation, Viscosity, Equations, Boundary value problems.

A discussion is given of two problems involving longitudinal motion in an obliquely incident applied magnetic field; the steady motion of a perfectly conducting semi-infinite plate and the oscillatory motion of a non-conducting plate. Both concern the propagation along magnetic field lines of diffusing Alfven waves which carry the disturbances produced at the plate into the fluid.

AD-612 856 Div. 25

Institute of Optics, Univ. of Rochester, N. Y.

EMISSION SPECTRA OF KI: Tl AT 12K.
Revised ed.,
by R. Edgerton and K. Teegarden. 29 Jun 64, 2p
Grant AF AFOSR236 63
AFOSR 65-0404

Unclassified report

Pub. in Physical Review (U. S.) v136 n4A p1091-2 Nov 16 1964 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 27 Aug 63.

Descriptors: (*Band spectrum, Thallium), (*Potassium compounds, Iodides), (*Thallium, Band spectrum), Cryogenics, Impurities, Single crystals, Excitation, Atomic energy levels.

Emission spectra were measured for separate excitation by light absorbed in the A, B, C, and D impurity absorption bands of single crystals of KI:Tl at 12K. Five emission bands are reported. Three emission bands are identified as direct transitions from the energy levels related to the A, B, and C absorption bands. Excitation in the D absorption band is found to excite an additional low-energy emission band which corresponds to a forbidden transition in absorption. (Author)

AD-612 866 Div. 25, 17

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PERITECTIC REACTION IN THE SUPERCONDUCTOR Nb3Sn (Cb3Sn),
by Frank J. Bachner, Harry C. Gatos and Mario D. Banus. 29 Jul 64, 4p
Contract SD90

Unclassified report

Pub. in Metallurgical Society of AIME. Transactions (U. S.) v233 p227-30 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Superconductors, Melting), (*Niobium alloys, Tin alloys), (*Tin alloys, Niobium alloys), Phase studies, Intermetallic compounds, Liquids, Microstructure.

The portion of the Nb-Sn phase diagram between 75 and 79 at. pct Nb at temperatures near the liquidus has been investigated by melting alloys of known composition and examining the microstructures resulting when these melts were quenched. The Nb-Sn samples were contained in magnesia sleeves, and were mounted in a high-pressure apparatus. It was shown that Nb3Sn melts by a peritectic decomposition Nb3Sn yields alpha Nb + Liq and that the composition of the compound Nb3Sn at the peritectic horizontal lies between 77 and 78 at. pct Nb. Analysis of the phases present in the samples was accomplished by anodic staining techniques and an electron-microbeam analyzer. (Author)

AD-612 867 Div. 25

New York Univ., N. Y.
METHOD OF ORTHOGONALITY CONSTRAINT AND REARRANGEMENT COLLISIONS.
Revised ed.,
by A. Chen, S. Tani, and S. Borowitz. 2 Oct 64, 11p
Contract Nonr28549; Grant DA ARO D31 124G276

Unclassified report

Pub. in Physical Review (U. S.) v137 n2B pB236-44 Jan 25 1965 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 13 Jul 64.

Descriptors: (*N-body problem, Potential theory), (*Potential theory, N-body problem), (*Perturbation theory, Nuclear scattering), Hamiltonian, Momentum, Green's function, Quantum mechanics.

In treating scattering problems involving a bound state, the method of orthogonality constraint modifies the potential by projecting out the 'binding' effect of the potential strong enough to support a bound state, and considers only its 'scattering' effect as the perturbation on a distorted wave which is orthogonal to the bound state. The 'modified' Born series obtained by iterating the relevant Lippmann-Schwinger integral equation is proved to be convergent, provided resonances not associated with the bound state are absent. The convergence proof is given for one-dimensional even waves and for a separable potential. However, the proof is also valid for the s waves. It is believed, on the basis of simplified analysis, that the method will work for a wide class of physically interesting potentials, though a rigorous proof for it is not available. The convergence of the Born expansion for rearrangement collisions is discussed in the context of a one-dimensional model for a three-body problem in which exchange scattering takes place. It is seen in the example that the kind of divergence pointed out by Aaron, Amado, and Lee may be removed by this method. (Author)

AD-612 871 Div. 25

Oxford Univ. (England).
PRESSURE BROADENING STUDIES ON VIBRATION-ROTATION BANDS. IV. OPTICAL COLLISION DIAMETERS FOR FOREIGN-GAS BROADENING OF CO AND DCl BANDS,
by C. Crane-Robinson and H. W. Thompson.
10 Aug 62, 14p
Contract AF61 052 202

Unclassified report

Pub. in Royal Society of London. Proceedings. Series A, Mathematical and Physical Sciences (Gt. Brit.) v272 p453-66 1963 (Copies available only to DDC users).

Descriptors: (*Absorption spectrum, Pressure), (*Deuterated compounds, Chlorides), (*Carbon compounds, Monoxides), Line spectrum, Gases, Diatomic molecules, Great Britain.

Results are given for the pressure broadening of lines in the vibration-rotation bands of carbon monoxide and deuterium chloride, by a wide variety of added gases including both non-polar and polar molecules. Optical collision diameters have been calculated and considered in relation to the interaction forces likely to be involved. For carbon monoxide, a rough correlation is found between the optical collision diameter and the interaction potential for non-polar broadeners where dispersion forces are dominant, but derivations occur with some polar broadeners. Similar data for deuterium chloride illustrate the importance of dipolar forces, but no simple theory explains the results satisfactorily. The variation of line width with J quantum number is discussed. (Author)

AD-612 874 Div. 25, 13
CFSTI Prices: HC$1.00 MF$0.50

Columbia Univ., New York.
ON THE BUCKLING OF CIRCULAR CYLINDRICAL SHELLS UNDER EXTERNAL PRESSURE,
by A. E. Armenakas and G. Herrmann. Aug 62, 21p
Technical note no. TN-7, CU-23-62-AF-430-CE
Contract AF49 638 430, Proj. 9782
AFOSR 3888

Unclassified report

See also AD-265 846.

Descriptors: (*Cylindrical bodies, Structural shells), (*Buckling, Structural shells), (*Structural shells, Buckling), Pressure, Stresses, Mathematical analysis, Loading (Mechanics), Numerical analysis, Differential equations, Deformation, Theory.

A general bending theory of circular cylindrical shells under the influence of initial stress, established recently by the authors, is employed in re-examining the buckling of such shells under external pressure, and the results are compared to those of previous investigations. Simple but accurate expressions for the buckling pressure applicable to a wide range of shell dimensions are presented. (Author)

AD-612 883 Div. 25, 9
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THERMOCAPILLARITY IN A LIQUID IN THE ABSENCE OF BODY FORCES,
by L. Ya. Lyubin and A. S. Povitskii. Feb 65, 18p
RSIC-379
TT 65-61847
Unclassified report

Trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) 1961, no. 2, p. 40-46.

Descriptors: (*Liquids, Thermodynamics), (*Bubbles, Thermodynamics), Motion, Drops, Boundary layer, Capillary tubes, USSR.

Consideration is given to the motion of discrete bubbles of an ideal gas, extended into a train along and across the direction of motion, or a drop of an ideal liquid not conducting heat in a nonuniformly heated viscous liquid as well as the motion within liquid bodies and the rotation or a drop in a viscous liquid or gas in the presence of a hot baffle. Body forces are not taken into account (for example, on the assumption that the dimensions of the drops or bubbles are small or that the specific gravities of both fluids are close to each other). (Author)

AD-612 885 Div. 25, 14
CFSTI Prices: HC$3.00 MF$0.75

Frankford Arsenal, Philadelphia. Research and Development Directorate.
EXPERIMENTAL STUDY OF NEODYMIUM DOPED GLASS LASER.
Technical research rept.,
by Alexander J. Casella. Feb 65, 59p
Rept. no. R-1748
Proj. 1A013001A091A
Unclassified report

Descriptors: (*Lasers, Glass), (*Glass, Lasers), (*Neodymium, Lasers), Impurities, Borates, Rods, Mirrows, Xenon lamps, Flash lamps, Pumping (Electronics), Calorimeters, Phototubes, Light transmission, Intensity, Tables.

Experimental studies were performed on the effect of doping level and diameter of neodymium glass rods and reflectivity of the output mirror on the threshold energy and output energy of the laser. Data are presented of the energy output of glass rods having diameters of 0.25 in, 0.393 in, and 0.5 in and doping levels of 1, 3, and 6 percent neodymium. In most cases, an output mirror reflectivity of 62% gave the highest energy output. Maximum output was obtained with the 1% doping, 0.5 in diameter rod, using a 62% reflecting mirror. Due to pitting of the rods, the data obtained were generally inconsistent and for the most part nonreproducible. (Author)

AD-612 897 Div. 25, 17
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
DIELECTRIC CONSTANT OF GERMANIUM AS A FUNCTION OF FREQUENCY, TEMPERATURE, AND RESISTIVITY,
by Maurice A. Druesne. Jan 65, 18p
Technical rept. ECOM-2553
Proj. 1P6 22001A056, Task 1P6 22001A056 03 02
Unclassified report

Descriptors: (*Germanium, Dielectric properties), (*Dielectric properties, Germanium), Resistance (Electrical), Low-temperature research, Extremely high frequency, Semiconductors, Solid state physics, Measurement.

The use of semiconductors in electronics has increased tremendously during the last decade and this growth will continue. One of the most important characteristics of semiconductors is the dielectric constant which determines their electrical behavior. Measurements of the dielectric constant have been made on p- and n- type germanium of various resistivities (20, 10, and 1/2 ohm-cm). At the same time the dielectric constant has been found to decrease with lower temperatures down to 78K. Similarly, the dielectric constant has been measured at various frequencies and was found to decrease with increasing frequency. At very low resistivity (1/2 ohm-cm) some anomalous behavior is found which is due to the fact that the material is no longer really a semiconductor, but begins to act as a conductor. (Author)

AD-612 900 Div. 25, 14
CFSTI Prices: HC$3.00 MF$0.75

IIT Research Inst., Chicago, Ill.
MECHANICAL RELAXATION OF TWO TYPES OF DEFECT IN MAGNESIUM OXIDE CRYSTALS.
Final rept. for 1 Feb 64-31 Jan 65,
by P. D. Southgate and K. S. Mendelson. 31 Jan 65,
58p Rept. no. IITRI-A6075
Grant DA ARO D31 124G528, Projs. 20010501B700, A6075
AROD 4518:1
Unclassified report

Descriptors: (*Ceramic materials, Crystal lattice defects), (*Crystal lattice defects, Relaxation time), (*Magnesium compounds, Oxides), Single crystals, Internal friction, Heat of activation, Symmetry (Crystallography), Heat treatment, Chromium, Impurities.

Two point defects in magnesium oxide single crystals which give rise to internal friction peaks at 200C and at 850C are studied. The first, which has a reorientation activation energy 0.64 eV, is now shown to have 100 symmetry. The annealing behavior has been studied in some detail, and this, together with the high pre-exponential factor in the relaxation time, is consistent with the defect being a trapped charge carrier. A theory is being developed in which the relaxation rate of the Jahn-Teller distortion due to an electron held in a Coulomb potential is calculated. Measurements have been made on the 850C internal friction peak, which is believed due to vacancy: impurity chromium pairs, for specimens in 100 and 111, of commercial purity, and also specially chromium doped. The peak is composed of several relaxational modes, and the temperature of these does not shift very much with orientation. The behavior

deviates strongly from that predicted by a model of closely bound vacancies, and an alternative model is being developed in which the vacancies are more remotely bound so that the relaxation shows a weaker orientation dependence. (Author)

AD-612 902 Div. 25, 14
CFSTI Prices: HC$1.00 MF$0.50

Optics Technology, Inc., Belmont, Calif.
LONG WAVELENGTH INFRARED FIBER OPTICS.
Interim engineering rept. no. 3, 16 Dec 64-15 Feb 65,
by N. S. Kapany and R. J. Simms. Mar 65, 16p
Contract AF33 615 1952, Proj. 4056, Task 405603
Unclassified report

Descriptors: (*Fiber optics, Infrared optical materials), (*Infrared optical materials, Fiber optics), (*Glass, Fiber optics), Ceramic fibers, Light transmission, Coatings, Pipes, Infrared radiation, Arsenic compounds, Sulfides.

Development work on far infrared transmitting fiber optics is reported. Effort during the third quarter has been concentrated on the following: 1) additional samples of glass were evaluated in fiber draws; 2) techniques were developed to demonstrate the presence of the coating glass on a coated fiber; and 3) transmission profiles and radiation pattern measurements were recorded for two types of coated fibers. The results are included in this report. Furthermore, effort on the development of techniques for fabricating short flexible light pipes was continued and several successful samples have been made using uncoated fibers. Two glass combinations have been used to produce short lengths of good quality coated fibers. Devitrification is still a problem, producing some seeds in long lengths of fiber, but additional draws are scheduled with these glasses in an attempt to minimize this defect. The optical evaluation equipment has proved to be satisfactory for the measurements required and the characteristic curve concept has been demonstrated. Light pipe fabrication techniques have been developed and appear to be satisfactory for the production of short flexible components. (Author)

AD-612 915 Div. 25, 17, 26
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
EFFECTS OF ULTRASOUND ON DEFORMATION CHARACTERISTICS OF STRUCTURAL METALS. PART 2. ACOUSTIC HEATING AND ZONE MELTING.
Rept. for 1 Jul 63-30 Jun 64,
by B. Langenecker, W. H. Frandsen, and A. Kennedy.
Feb 65, 14p Technical Progress rept. no. TPR-371, pt2, NOTS-TP-3788
Unclassified report

See also AD-446 394.

Descriptors: (*Ultrasonic radiation, Material forming), (*Metals, Deformation), (*Deformation, Ultrasonic radiation), Heating, Zone melting, Stresses, Mechanical waves, Energy conversion, Internal friction, Fracture (Mechanics), Steel, Elasticity, Electron microscopy.

High-intensity ultrasound at 20 kc/sec is used in studies of mechanisms of metal deformation and treatment. Quantitative details about the experimental conditions are provided in the five parts of this report: (1) modes of intense ultrasonic stress waves in rods and bars, (2) conversion of acoustic energy into heat, (3) applications of ultrasound at high strain rate tensile tests, (4) measurements of internal friction during high-intensity ultrasonic radiation of metals, and (5) discussion of ultrasonic metal deformation along with a comparison between our observations and other reports on the subject of ultrasonic metal forming processes. (Author)

AD-612 916 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Princeton Univ., N. J.
RESEARCH ON DIELECTRIC PROPERTIES AND THE STRUCTURE OF MATTER.
Quarterly status rept. no. 35, 1 Oct-31 Dec 64,
by Charles P. Smyth. 31 Dec 64, 4p
Contract Nonr-185809, Proj. NR014 201
Unclassified report

See also AD-610 998, AD-610 999.

Descriptors: (*Polymers, Molecular properties), (*Dielectric properties, Measurement), Molecular structure, Molecular rotation, Aromatic compounds, Halogenated hydrocarbons, Liquids.

A new apparatus for the measurement of the dielectric constants and losses of low-loss liquids at 2-mm wavelength has been set up. Toluene was measured first, since accurate data were available for this substance at millimeter wavelengths. Results turned out to be in excellent agreement with these data. Measurements on pure chlorobenzene showed that this apparatus also gave accurate values of dielectric constant and loss of medium-loss liquids.

AD-612 924 Div. 25, 15
CFSTI Prices: HC$2.00 MF$0.50

Queen's Univ., Belfast (Northern Ireland).
AN EXPANSION METHOD FOR CALCULATING ATOMIC PROPERTIES. V. TRANSITION PROBABILITIES OF M-SHELL ELECTRONS,
by R. J. S. Crossley and A. Dalgarno. 1964, 30p
Contract N62558 3634
Unclassified report

See also AD-277 741.

Descriptors: (*Electron transitions, Probability), (*Probability, Electron transitions), Integrals, Power series, Atomic energy levels, Atomic properties, Sodium, Magnesium, Atomic spectroscopy, Astrophysics, Eire.

The expansion method is extended to M-shell electrons and explicit calculations are carried out of the probabilities of all dipole transitions between configurations 1s32s23e - 1s22s23e and between configurations 1s22s23e1 3 e2 - 1s22s23e1 3e2, taking into account the mixing of degenerate configurations. Results are presented for all members of the sodium and magnesium isoelectronic sequences. (Author)

AD-612 925 Div. 25
CFSTI Prices: HC$3.00 MF$0.50

Ohio State Univ. Research Foundation, Columbus.
X-RAY SPECTROSCOPY.
Final rept. for 1 May 58-31 May 64,
by C. H. Shaw and E. L. Jossem. Jul 64, 52p
Rept. no. 809-15
Contract Nonr49516, Projs. NR017 606, 809
Unclassified report

Descriptors: (*X-ray spectroscopy, Quartz), (*Quartz, X-ray spectroscopy), X-ray absorption analysis, X-ray diffraction analysis, Crystallography, Scattering.

The results of the investigation show that synthetic quartz can be obtained with spectrometric properties which are sufficiently good to permit them to be used as replacements for natural quartz in high-resolution x-ray spectroscopy. It is possible that special high purity, high 'Q', synthetic quartz may prove to be even better than any of the crystals, synthetic or natural, investigated for this thesis. It has also been shown that a pair of crystals can be adequately characterized only by its complete rocking curve, and a comparison of these curves is the only reliable method of crystal selection. This has been pointed up by such apparent anomalies as two crystal pairs having the same (1,+1) curve width and different (1,-1) curve widths, and two crystal pairs having the same per cent reflection and different (1,-1) curve widths. The fact that the (1,-1) curve width for some crystal pairs changed in the relatively short time of five months indicates that if one wishes to make reliable resolving power corrections to observed spectra, he must keep a constant check on the shape of the (1,-1) curve. The effect of x-radiation damage on the x-ray reflection characteristics of natural quartz has been investigated. It has been found that there are no immediate effects, although the displaced electrons may catalyze surface corrosion and thus may help to produce the long-term deterioration effects which have been observed. (Author)

AD-612 928 Div. 25, 17
CFSTI Prices: HC$1.00 MF$0.50

National Research Corp., Cambridge, Mass.
THERMODYNAMIC PROPERTIES OF BIMETALLIC COMPOUNDS.
Quarterly letter rept. for 1 Oct-31 Dec 63,
by Ludwig Fasolino. 31 Dec 63, 5p
Contract Nonr360800, Proj. 3910; ARPA Order 23 61
Unclassified report

Descriptors: (*Intermetallic compounds, Thermodynamics), (*Thermodynamics, Intermetallic compounds), Calorimeters, Fluorine, Combustion, Test methods, Aluminum alloys, Boron alloys, Powder alloys.

AD-612 932 Div. 25, 4
CFSTI Prices: HC$1.00 MF$0.50

General Electric Co., Syracuse, N. Y.
AROMATIC ORGANIC LASER DEVELOPMENT.
Quarterly rept. no. 7,
by David L. Stockman. 1965, 4p
Contract Nonr413500, Proj. 3730; ARPA Order 306 62
Unclassified report

Descriptors: (*Lasers, Organic materials), (*Organic materials, Lasers), (*Aromatic compounds, Lasers), Fluorescence, Polymers, Rods, Acrylic resins, Phthalates, Optical properties, Lighting equipment.

Progress towards the development of a laser employing fluorescent organic compounds is discussed with emphasis upon obtaining the exact composition of polymer required to achieve the desired optical properties. Dibutylphthalate (DBP) is added to the methyl methacrylate monomer in order to reduce the stress optical coefficient. The difficulties of making accurate measurements of the stress optical coefficient around the zero point are discussed. It proved impossible to measure the stress optical coefficient with sufficient accuracy. It was determined that 10% by weight DBP was approximately the right concentration for a zero stress optical coefficient. A series of polymers were prepared arranging from 9 to 11% DBP in 0.1% intervals. After annealing, those samples in the range of 10.4 to 10.6 per cent DBP were free of any birefringence with the 10.5% being the optimum concentration.

AD-612 962 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
OPTICAL AND INFRARED ABSORPTANCE AND EMISSION PROPERTIES OF SOLID H2O, CO2, N2, AND O2: AN ANNOTATED BIBLIOGRAPHY, 1958-1962.
comp. by Scott J. Buginas. Nov 62, 9p
Rept. no. 5-10-62-53, SB-62-59
Unclassified report

Descriptors: (*Cryogenics, Optical phenomena), (*Infrared radiation, Solid state physics), (*Luminescence, Solid state physics), (*Bibliographies, Optical phenomena), (*Spectroscopy, Optical phenomena), Crystals, Ice, Solidified gases, Nitrogen, Oxygen, Carbon compounds, Gases, Xenon, Argon, Methane, Ammonia, Optical equipment.

AD-612 964 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Corning Glass Works, N. Y.
GLASS LASER RESEARCH.
Semiannual technical rept. for Jul-Dec 64,
by R. D. Maurer, N. F. Borrelli, M. E. Vance, G. E. Strong, and S. D. Sims. 30 Jan 65, 99p
Contract Nonr383300, Proj. 7300, ARPA Order 306 62
Unclassified report

See also AD-443 680.

Descriptors: (*Glass, Lasers), (*Lasers, Glass), (*Neodymium, Lasers), Neodymium compounds, Solar radiation, Degradiation, Absorption, Fluorescence, Pumping (Electronics), Energy, Spectroscopy, Gain, Absorption spectrum, Light, Optical properties.

This report comprises a series of investigations aimed at the more efficient utilization of neodymium glass lasers. Sections 1 and 2 involve the deterioration under intense light. Damage on the cylindrical surface due to pump light has been shown due to scratches and imbedded particles. This is eliminated by chemical treatment of the surface. The mechanism of solarization is delineated and the problem eliminated by pump light filtering with a minimal 15 per cent loss in output. Sections 3 and 4 involve the improvement of performance by varying external conditions. Sections 5, 6, 7 and 8 involve processes occurring within the laser itself. A detailed investigation to find an accurate value of the gain cross section (without assuming degeneracies) shows that a straight-forward spectroscopic study can only yield this quantity within a factor of two. Gain measurements in an amplifier are determined for eventual translation, through the gain cross section, into energy storage and real pump efficiency. The final section gives data on the time resolved distortion of a pumped rod to determine the magnitude of this problem in preventing diffraction limited operation. A 15cm rod, under 7000 joule electrical input to the pump light, developed a distortion of several fringes across the aperture. (Author)

AD-612 967 Div. 25

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
STRUCTURE-FACTOR AND LEAST-SQUARES EXPRESSIONS FOR CUBIC CRYSTAL SYSTEMS WITH ISOTROPIC VIBRATIONS,
by Ned C. Webb. 7 May 63, 3p
Contract Nonr22033

Unclassified report

Pub. in Acta Crystallographica (Denmark) v17 pt1 p69-71 Jan 1964 (Copies available only to DDC users).

Descriptors: (*Crystallography, Least squares method), (*Least squares method, Crystallography), Crystal structure, Crystal lattice defects.

A set of expressions is presented for calculating structure-factors and least-squares coefficients for cubic structures with isotropic temperature factors. These expressions have been utilized in programming the Burroughs 220 and IBM 7090 computers to perform structure-factor least-squares calculations for any cubic space group; to direct the course of calculations for a particular space group, only the space group number need be designated. The expressions complement those presented by Hybl and Marsh for the orthorhombic system.

AD-612 968 Div. 25, 17

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
THE STRUCTURE OF SrZn2,
by B. G. Bergman and P. J. Shlichta. 8 Aug 63, 2p
Contract Nonr22033

Unclassified report

Pub. in Acta Crystallographica (Denmark) v17 pt1 p65-6 Jan 1964 (Copies available only to DDC users).

Descriptors: (*Strontium alloys, Zinc alloys), (*Zinc alloys, Strontium alloys), (*Crystal structure, Strontium alloys), Phase studies, Least square methods.

AD-612 969 Div. 25, 15

Queen's Univ., Belfast (Northern Ireland).
ELECTRON EXCHANGE IN IMPACT IONIZATION OF ATOMIC HYDROGEN,
by S. S. Prasad. 19 Aug 64, 4p
Contract N62558 3634

Unclassified report

Pub. in Physical Society. Proceedings (Gt. Brit.) v85 p57-9 1965 (Copies available only to DDC users).

Descriptors: (*Ionization, Hydrogen), (*Electrons, Excitation), (*Excitation, Ionization), Perturbation theory, Scattering, Atomic energy levels, Series.

Methods hitherto used for allowance for exchange in the treatment of electron impact ionization of atomic hydrogen are discussed. A simple method based upon Ochkur's simplification of the Born-Oppenheimer approximation is also studied and found to give very good results. (Author)

AD-612 970 Div. 25

Queen's Univ., Belfast (Northern Ireland).
THE NUMERICAL EVALUATION OF THE CLASSICAL ANGLE OF DEFLECTION AND OF THE J. W. K. B. PHASE SHIFT,
by F. J. Smith. 25 Jul 63, 8p
Contract N62558 3634

Unclassified report

Pub. in Physica (Netherlands) v30 p497-504 1964 (Copies available only to DDC users).
Rept. on Proj. DEFENDER.

Descriptors: (*Phase shift, Numerical analysis), (*Numerical analysis, Deflection), Scattering, Potential theory, Molecule properties, Integration.

The numerical formulae derived are based on Gauss-Mehler quadratures and are believed to be in general more accurate and simpler than other known formulae.

AD-612 971 Div. 25

Queen's Univ., Belfast (Northern Ireland).
THE POLARIZABILITIES AND SHIELDING FACTORS OF THE BERYLLIUM SEQUENCE,
by A. Dalgarno and H. A. J. McIntyre. 16 Sep 64, 5p
Contract N62558 3634

Unclassified report

Pub. in Physical Society. Proceedings (Gt. Brit.) v85 p47-50 1965 (Copies available only to DDC users).
See also AD-612 753.

Descriptors: (*Beryllium, Dipole moments), (*Dipole moments, Electric moments), (*Atomic structure, Beryllium), Quadrupole moments, Atomic charge, Perturbation theory, Atomic orbitals, Polarization, Boron, Carbon, Ions.

The fully coupled Hartree-Fock approximation is used to calculate the dipole and quadrupole polarizabilities and shielding factors of Be, B(+) and C(2+). (Author)

AD-612 973 Div. 25, 15

Queen's Univ., Belfast (Northern Ireland).
H2(+) WAVE FUNCTIONS,
by A. R. Holt. 9 Jul 64, 3p
Contract N62558 3634

Unclassified report

Pub. in Cambridge Philosophical Society. Proceedings (Gt. Brit.) v61 p207-9 1965 (Copies available only to DDC users).

Descriptors: (*Hydrogen, Molecular structure), (*Molecular structure, Functions), Quantum mechanics, Molecules, Ions, Harmonic analysis.

Analytic fits have been found for the radial functions of some of the lower states of the hydrogen molecular ion. For each state fits have been obtained for the first two radial functions. The method of fitting was inwards, and difficulty was experienced in fitting accurately in the region between the nuclei due to the discontinuity in the derivative of the wave function with respect to r at the nuclei.

AD-612 983 Div. 25

Princeton Univ., N. J.
THE USE OF A FREQUENCY CHECK IN THE VECTOR VERIFICATION METHOD.

Revised ed.,
by Byron T. Gorres and Robert A. Jacobson. 13 Feb 64, 5p

Unclassified report

Pub. in Acta Crystallographica (Denmark) v17 pt12 p1599-1603 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Symmetry (Crystallography), Determination), (*Crystal structure, Determination), Pyridines, Amines, Chlorine compounds, Atoms, Electrons, Density, Binary digits, Boron compounds, Chlorides.

The frequency check, utilizing three-dimensional superpositions of the Patterson and vector verification maps, assigns relative values to positions in electron-density space which are consistent with both the Patterson function and the space group symmetry of the crystal system. These relative values-which represent the extent of peak coincidence between a Patterson and electron-density function-facilitate the choice of the first tentative atom position, a decisive factor in the success of the vector verification procedure. Employing a bivalued Patterson map, each three-dimensional superposition resulting in a relative value requires one to five seconds on a large solid state computer. (Author)

AD-612 984 Div. 25, 4

Oxford Univ. (England).
DEVELOPMENT AND APPLICATION OF INFRARED.
Final technical rept. for period ending 30 Jun 64,
by H. W. Thompson, J. P. Jesson, G. H. J. Facer, C. Heald, and C. C. Robinson. 1964, 80p
Contract AF61 052 202
AFCRL 65-106

Unclassified report

Pub. in Royal Society of London. Proceedings. Series A. Mathematical and Physical Sciences (Gt. Brit.) and Spectrochimica Acta (England) v18 p1095-7 1962 (Copies available only to DDC users).

Descriptors: (*Infrared spectroscopy, Molecular properties), (*Raman spectroscopy, Molecular properties), (*Molecular spectroscopy, Infrared spectroscopy), (*Physical chemistry, Infrared spectroscopy), Organic compounds, Halides, Solvents, Aliphatic compounds, Aromatic compounds, Absorption spectrum, Vibration, Band spectrum.

The research involved (1) a number of technical improvements in infrared and Raman measurements, and (2) the application of these methods to a variety of problems including the determination of the molecular structural and dynamic constants of small molecules, vibrational band intensities and their significance, and intermolecular forces and interactions including solvent effects. The infrared measurements were carried out with both medium and high resolution, and were extended where relevant to the longer wavelength range 500 - 50 cm. The subjects examined and the main results obtained are summarized. A list of publications which have already appeared on the work is given at the end of the report, but much of the work is still being evaluated in detail and prepared for later publication. During the period covered by this report, about 80 bands of methyl and deuteromethyl halides were analysed.

AD-612 985 Div. 25, 4

Oxford Univ. (England).
INTENSITIES OF CH VIBRATION BANDS IN HALOFORMS AND METHYLENE HALIDES,
by C. C. Robinson, S. A. Tare, and H. W. Thompson.
28 May 62, 8p
Contract AF61 052 202

Unclassified report

Pub. in Royal Society of London. Proceedings. Series A. Mathematical and Physical Sciences (Gt. Brit.) v269 p492-9 1962 (Copies available only to DDC users).

Descriptors: (*Halogenated hydrocarbons, Band spectrum), (*Band spectrum, Halogenated hydrocarbons), (*Carbon tetrachloride, Band spectrum), (*Chloroform, Band spectrum), Absorption spectrum, Vibration, Vapors, Solutions, Chemical bonds, Polarization, Great Britain.

Vibrational band intensities of CH and CH2 groups in haloforms and methylene halides have been measured in the vapour phase, and for solutions in carbon tetrachloride. Marked variations of band intensity in the vapour phase occur along the series fluoroform, chloroform, bromoform, and the relative intensities of the first overtone bands also show interesting differences. With solutions in carbon tretrachloride the band intensities are often increased considerably. Similar data have been obtained for the symmetric and antisymmetric CH2 group vibrations of the methylene halides. An interpretation of some of the results has been suggested in terms of the polar properties and electrical anharmonicity of the vibrating bonds. The effect of solvent observed again emphasizes the importance of solute-solvent interactions, even in non-polar media. (Author)

AD-613 016 Div. 25, 9, 22
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania State Univ., University Park. Dept. of Engineering Mechanics.
MOTION OF THE DETONATION PRODUCTS BEHIND PLANE AND SPHERICAL DETONATION WAVES IN SOLID EXPLOSIVES,
by H. H. Calvit. 30 Nov 64, 23p
Technical rept. no. TR-3
Contract DA36 034ORD3576RD

Unclassified report

Prepared in cooperation with Ballistic Research Labs., Aberdeen Proving Ground, Md.
See also AD-415 617.

Descriptors: (*Explosive gases, Motion), (*Detonation waves, Pentolite), (*Pentolite, Detonation waves), Numerical analysis, Programming (Computers), Shock waves, Differential geometry.

The problems dealt with in this report are the behavior of the explosive gases behind a plane and spherical detonation wave in a condensed (solid) explosive (Pentolite). The analysis is numerical and considerable detail is given to the development of the computer programs which appear in the Appendix. The boundary conditions are obtained from the analysis of Pentolite by Shear, which also furnishes the equation of state for the explosive products. Comparison is made with classical mathematical results based on a similarity assumption and credited to G. I. Taylor.

AD-613 021 Div. 25, 14
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
TRANSITION OF RADIAL AND AXIAL MODES IN VIBRATING CYLINDERS,
by George K. Lucey, Jr. 15 Jan 65, 21p
Rept. no. TR-1270
Projs. DA1N523 801A300, 96300

Unclassified report

Descriptors: (*Resonance, Cylindrical bodies), (*Cylindrical bodies, Vibration), Ceramic materials, Disks, Rods, Piezoelectric crystals, Energy, Transformers, Equations, Ferroelectric materials.

Two equations to determine resonant frequencies, one for thick disks and one for thick rods, were previously derived in TR-1108, 'Resonant Frequencies of Cylinders of Any Dimensions' (AD-401 688). This report defines the dimension ratios of cylinders to which each equation is applicable. In addition, the two equations are modified by expressing an empirical constant in terms of material properties. The validity of these new equations is demonstrated by applying them to the published data of Shaw, Bechmann, and McMahon. (Author)

AD-613 024 Div. 25, 1, 30
CFSTI Prices: HC$3.00 MF$0.75

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
SPECTRAL CHARACTERISTICS OF SOME PRACTICAL VARIATIONS IN THE HALF-SINE AND SAWTOOTH PULSES.
Rept. for 1 Feb-1 Aug 64,
by Edward H. Schell. Jan 65, 65p FDL-TR-64-175
Proj. 1309, Task 130904
Unclassified report

Descriptors: (*Shock (Mechanics), Design), (*Fourier analysis, Shock (Mechanics)), Mechanical waves, Environmental tests, Failure (Mechanics), Aircraft equipment.

This report deals with shock analysis and design as they affect equipment. Considered in the analysis is a two part function composed of a ramp tangent to a half-sine pulse in which the rise times and decay times can be controlled independently of each other. Such a pulse is more representative of the physical condition present in a partially plastic, partially elastic shock machine such as the lead pellet types. The pulse is changed by increments from an ideal terminal peak sawtooth to an ideal half-sine. Positive and negative response spectra with a range of damping from zero to critical are presented. Fourier spectra are also presented. Insofar as is known, this is the first time these test pulses have been studied in such detail. The data presented should prove quite useful for designers using several response spectrum or Fourier spectrum techniques for design problems resulting from sawtooth or half-sine shock tests. The report shows an important type of modal interaction failure which cannot be adequately excited with a symmetrical waveform even if testing is accomplished in both directions. (Author)

AD-613 030 Div. 25, 8

Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
ON THE STATISTICAL THEORY OF ELECTROMAGNETIC WAVES IN A FLUCTUATING MEDIUM (II). MATHEMATICAL BASIS OF THE ANALOGIES TO QUANTUM FIELD THEORY.
by K. Furutsu. 7 Dec 64, 48p
Monograph NBS-M-79
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.35, as C13.44:79, GPO-65-2932.

Descriptors: (*Electromagnetic waves, Quantum statistics), (*Quantum statistics, Electromagnetic waves), (*Field theory, Quantum statistics), Green's function, Quantum mechanics, Matrix algebra, Propagation.

Many analogies to quantum field theory are inherent in the statistical theory of waves. This is due to the fact that basic equations exist in the latter theory which correspond closely to the fundamental equations of the former theory; i.e., to the commutation relations and the Heisenberg equation of motion. A probability density function of waves is introduced which corresponds to the probability amplitude function in quantum mechanics. The boundary conditions at infinity for this probability density function are then found to be expressed in the same form as the vacuum boundary conditions in field theory. The theory of the statistical Green's functions and their relationships to the expectation values of the physical variables is also extensively developed, using auxiliary external sources of the wave and of the fluctuating medium. It is found that there exists a one-to-one correspondence between the formalism of Green's functions presented here and that used in field theory. The above correspondence may be important for a further development of the statistical theory of waves, just as the advanced techniques of field theory have greatly influenced the development of thermodynamics (or statistical physics). (Author)

AD-613 037 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MODAL ANALYSIS AND SYNTHESIS OF ELECTROMAGNETIC FIELDS,
by Leopold B. Felsen and Nathan Marcuvitz.
4 Nov 64, 73p Research rept. no. PIBMRI-1243-64
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 65-86
Unclassified report

See also AD-606 512.

Descriptors: (*Electromagnetic fields, Synthesis), (*Plasma physics, Electromagnetism), Magnetohydrodynamics, Diffraction, Dielectrics, Waveguides.

Modal methods are employed to represent the electromagnetic fields due to confined source distributions in an infinite, homogeneous, gyrotropic dielectric, with special emphasis on the case of a magnetoplasma. It is shown how the plane wave refractive index surfaces for the medium may be employed to impose the radiation condition, to locate stationary points in the integral representation, and to interpret the asymptotic field approximation in ray-optical terms. The field behavior in transition regions is emphasized. The results are then extended to plane stratified media, with the gyrotropic axis parallel to the direction of stratification. The discussion concludes with the treatment of simple diffraction problems wherein unidirectionally propagating surface waves may play a role. (Author)

AD-613 049 Div. 25, 20
CFSTI Prices: HC$1.00 MF$0.50

National Water Lift Co., Grand Rapids, Mich. Instrumentation and Control Operations.
APPLIED RESEARCH INVESTIGATION OF ELECTRIC FIELD SOURCES VIA SOLID IONS MATRIX.
Rept. for Jul 64-Mar 65,
by Robert F. Elder. Mar 65, 19p
Contract AF33 615 2041, Proj. 8128, Task 812808
APL TR-65-5 Unclassified report

Descriptors: (*Electric fields, Sources), (*Electrons, Storage), (*Electron bombardment, Dielectrics), (*Dielectrics, Electrostatic generators), Quartz, Electrets, Solids, Crystal lattices, Charged particles, Absorption, Van De Graaff generators, Vacuum apparatus, Electron beams, Particle accelerator targets.

The results are presented of a study program involving the generation of a stored electric field, analogous to a permanent magnet field, using dielectric materials bombarded with low energy beta particles. Methods for achieving the volumetric distribution of such particles in a solid dielectric material (quartz) were investigated utilizing the VanDeGraff generator principle. The technique utilized combinations of high voltage accelerator and high vacuum systems. (Author)

AD-613 052 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
MAGNETIC ANISOTROPY FIELDS IN SINGLE-CRYSTAL IRON GARNETS.
Scientific rept.,
by Peter D. Gianino. Feb 65, 48p
Physical sciences research paper no. PSRP-79, AFCRL-65-77
Proj. 5621, Task 5621 04
Unclassified report

Descriptors: (*Garnets, Magnetic properties), (*Anisotropy, Garnets), (*Ferromagnetic materials, Garnets), Single crystals, Iron compounds, Yttrium compounds, Lutetium compounds, Gallium compounds, Indium compounds, Oxides, Cryogenics, Magnetic resonance, Hysteresis, Low-temperature research, Electrostatic fields.

Measurements of the temperature dependency of first- and second-order anisotropy fields, as well as g-factors, have been made on single crystal iron garnets of yttrium, lutetium, gallium-yttrium, and indium-yttrium. Unit formulas are denoted by Y3Fe5O12, Lu3Fe5O12, YeFe(5-z) Ga(z)O12, and Y3Fe(5-z)InzO12, respectively. Results show that at any given temperature, first-order anisotropy fields within the yttrium iron garnet are enhanced by the substitution of gallium and diminished by the substitution of indium, and that for any given sample, these fields increase as temperature is lowered. Low temperature anisotropy fields for lutetium iron garnet, while completely at variance with those previously reported, are as expected. However, the anisotropy surface of lutetium iron garnet is highly convoluted at liquid helium temperatures. Also, there is evidence that anisotropy fields are independent of sample size effects. No experimental evidence of effects due to an external electrostatic field or of thermal hysteresis could be detected. Secondary peaks observed superimposed on the principal resonance absorption curve of some of the samples over many temperatures are noted. Derivations are given of the cubic system anisotropy energy and Kittel's 'effective demagnetization factors' in the (110) plane up to third order. (Author)

AD-613 057 Div. 25, 20, 30
CFSTI Prices: HC$3.00 MF$0.75

Aspen Inst. for Humanistic Studies, Colo.
REPORT ON A SERIES OF RESEARCH CONFERENCES ON THEORETICAL PHYSICS.
1964, 62p
Contract Nonr446000 Unclassified report

Descriptors: (*Symposia, Physics), (*Physics, Theory), Reports, Superconductors, Field theory, Relativity theory, Quantum mechanics, Group theory, Elementary particles, Annihilation reaction, Cryogenics, Crystallography, Alloys.

A report is given on a series of research conferences on theoretical physics, conducted by the Aspen Institute for Humanistic Studies.

AD-613 063 Div. 25, 8
CFSTI Prices: HC$2.00 MF$0.50

Perkin-Elmer Corp., Norwalk, Conn. Electro-Optical Div.
TUNABLE COHERENT LIGHT SOURCE.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 64,
by N. I. Adams. 31 Oct 64, 27p PE-TR-7863
Contract Nonr457200
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Lasers, Gain), (*Light transmission, Tuning devices), (*Tuning devices, Light transmission), Crystal oscillators, Pumping (Electronics), Oscillation, Broadband, Light, Parametric amplifiers, Optics, Calibration.

The purpose of this program is to conduct research toward the development of a tunable coherent light source based on nonlinear optical effects, to demonstrate a tunable coherent light source, and to demonstrate parametric gain at optical frequencies.

AD-613 073 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
ELECTRON-IONIZATION CROSS SECTIONS.
Semiannual progress rept. no. 3, 15 Jun-15 Dec 64,
by C. K. Crawford and F. R. Roddy. 15 Dec 64, 15p
Contract AF33 657 10939
Unclassified report

Descriptors: (*Gas ionization, Measurement), (*Titanium, Ionization), Electrons, Electron guns, Electron lenses, Electron multipliers, Mass spectroscopy, Spectrum analyzers, Performance (Engineering), Instrumentation.

The wire-wound ionization-chamber technique was given its initial tests. Performance was satisfactory. Two electron monochrometers were constructed; testing is in progress. The design and procurement of a new set of standard parts was completed. Ionization cross-section measurements for titanium were initiated. (Author)

AD-613 080 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Perkin-Elmer Corp., Norwalk, Conn. Electro-Optical Div.
TUNABLE COHERENT LIGHT SOURCE.
Quarterly progress rept. no. 3, 1 Nov 64-31 Jan 65,
by N. I. Adams. 31 Jan 65, 19p Rept. no. PE-TR-7946
Contract Nonr457200 Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.
See also AD-613 063.

Descriptors: (*Lasers, Gases), (*Tuning devices, Lasers), Helium, Neon, Excitation, Pumping (Electronics), Radiofrequency pulses, Plasma oscillations, Power supplies, Dust, Gain.

The following details of the laser device are discussed: RF cleanup, power supply problems, dust, minimum detectable change of gain, the marginal oscillator (laser) system, and chopping.

AD-613 084 Div. 25, 17

Atomic Energy of Canada, Ltd., Chalk River (Ontario).
PREPARATION, IDENTIFICATION AND CRYSTAL STRUCTURE OF SmAl,
by O. J. C. runnalls and G. W. Lorimer. 31 Aug 64, 3p AECL-2119

Unclassified report

Pub. in Journal of the Less-Common Metals (Netherlands) v8 p75-7 1965 (Copies available only to DDC users).

Descriptors: (*Samarium alloys, Aluminum alloys), (*Single crystals, Samarium alloys), (*Crystal structure, Samarium alloys), Crystal growth, X-ray diffraction analysis, Chemical analysis, Phase studies, Crystal lattices.

Single crystals of the intermetallic phase SmAl were formed on an Al2O3 surface during an attempt to produce single crystals of samarium metal. This note describes the production of the SmAl crystals, the use of X-ray fluorescence and electron probe techniques to determine the chemical composition of the crystals, and the X-ray diffraction data obtained.

AD-613 089 Div. 25

California Inst. of Tech., Pasadena.
THE ABSOLUTE OSCILLATOR STRENGTHS OF LINES IN THE SPECTRA OF TEN ELEMENTS,
by G. M. Lawrence, J. K. Link, and R. B. King.
5 Aug 64, 16p
Contract Nonr22006

Unclassified report

Pub. in Astrophysical Journal (U. S.) v141 n1 p293-307 1 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Metals, Electron transitions), (*Electron transitions, Metals), Line spectrum, Measurement, Chromium, Cobalt, Nickel, Gallium, Palladium, Refractive index, Silver, Indium, Tin, Gald, Thallium, Atomic properties, Elements.

The absolute f-values of thirty-eight lines in the spectra of neutral Cr, Co, Ni, Ga, Pd, Ag, In, Sn, Au, and Tl have been measured by the atomic-beam technique. The estimated absolute accuracies of the measurements vary between 10 and 20 per cent. The results are compared with those of other investigators, and factors are obtained whereby published lists of relative f-values may be converted to an absolute scale. (Author)

AD-613 097 Div. 25, 9

Institute for the Study of Metals, Univ. of Chicago, Ill.
OSCILLATING BOUNDARY LAYER IN MAGNETO-HYDRODYNAMICS. I. NONCONDUCTING BOUNDARY.
Doctoral thesis,
by Douglas R. Caldwell. 12 Sep 63, 9p
Contract Nonr212120

Unclassified report

Pub. in Physics of Fluids (U. S.) v7 n7 p1062-70 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetohydrodynamics, Boundary layer), (*Boundary layer, Disks), Rotation, Oscillation, Damping, Conical bodies.

The hydromagnetic motion caused in an infinite fluid by an oscillating nonconducting boundary was studied theoretically. The results were confirmed experimentally by measurements of the damping of a torsional pendulum suspended in mercury in the presence of an axial magnetic field. (Author)

AD-613 098 Div. 25, 9

Institute for the Study of Metals, Univ. of Chicago, Ill.
OSCILLATING BOUNDARY LAYER IN MAGNETO-HYDRODYNAMICS II. CONDUCTING BOUNDARY.
Doctoral thesis,
by Douglas R. Caldwell. 12 Sep 63, 11p
Contract Nonr212120

Unclassified report

Pub. in Physics of Fluids (U. S.) v7 n8 p1338-48 Aug 1964 (Copies not available to DDC or Clearinghouse customers)
See also AD-613 097.

Descriptors: (*Magnetohydrodynamics, Boundary layer), (*Boundary layer, Electrical conductance), Oscillation, Disks, Mercury, Viscosimeters.

The experimental data obtained from the oscillating disk viscometer gave good qualitative agreement with the calculations made from the infinite plane approximation. The importance of the boundary conditions at the boundaries of the fluid is clearly demonstrated. The passive conducting boundary absorbs the Alfvén waves and prevents the sort of build-up of reflections that occurs with a nonconducting boundary. (Author)

AD-613 104 Div. 25

Air Force Cambridge Research Labs., Bédford, Mass.
ABSORPTION SPECTRA OF H2 IN THE VACUUM ULTRAVIOLET REGION. II. THE B'-X, B double prime-X, D-X, AND D' -X BANDS,
by T. Namioka. 28 May 64, 21p
Physical Sciences Research Papers no. PSRP-81, AFCRL-65-111
Proj. 8627, Task 862702

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n7 p2141-52 Oct 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrogen, Absorption spectrum), (*Absorption spectrum, Hydrogen), Vacuum, Spectra (Visible and ultraviolet), Atomic energy levels, Electron transitions, Molecular spectroscopy, Molecular properties.

The absorption spectrum of the H2 molecule has been studied in the wavelength region 840 to 930 A with a

6.8 m grazing incidence vacuum spectrograph in combination with the helium continuum. All the possible levels, which lie below the dissociation limit H(1(2)S sub g) + H(2(2)S sub g, 2(2)P sub u), of the odd singlet states have been identified in the present investigation. There are strong heterogeneous perturbations between the B' and the D states, weak heterogeneous perturbations between the B' and D' states and a medium strength homogeneous perturbation between the B' and the B double prime states. The perturbation parameters have been estimated in each case. In the present paper, the results of the rotational and vibrational analyses are given for the B' -X, B double prime -X, D-X, and D' -X bands. The experimental evidence found in the present study suggests that the predissociation in the levels with > or=3 of the D state is of the type b(o), according to Mulliken's classification. (Author)

AD-613 110 Div. 25, 4, 14

Princeton Univ., N. J.
THE CRYSTAL STRUCTURE OF DI-MU-DIPHENYLPHOSPHINATOACETYLACETONATOCHROMIUM (III),
by C. E. Wilkes and R. A. Jacobson. 24 Aug 64, 5p
Grant NSF GP579
AROD 3083:13
Unclassified report

Pub. in Inorganic Chemistry (U. S.) v4 n1 p99-103 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Inorganic polymers, Crystal structure), (*Metalorganic compounds, Crystal structure), (*Chromium compounds, Metalorganic compounds), (*Organic phosphorus compounds, Crystal structure), (*Crystal structure, Inorganic polymers), Chemical bonds, Crystal lattices, Anisotropy, Molecular structure, X-ray diffraction analysis, Single crystals, Heat-resistant plastics.

The structure of di-mu-diphenylphosphinatoacetylacetonatochromium(III), with sixty atoms in the asymmetric unit, was determined by Patterson superposition and Fourier techniques. Two molecules crystallize in a triclinic unit cell with dimensions a = 12.64,b = 15.57, c = 13.35 A., alpha = 112.4 degrees, beta = 112.50 degrees, gamma = 84.2 degrees. The ligands around the chromium atoms conform to octahedral symmetry and the bridge structure, (CrOPO)2, is a puckered eight-membered ring. Block diagonal least-squares refinement with Cr, P, and O atoms anisotropic resulted in a final R value of 0.09 for 4400 observed reflections. (Author)

AD-613 112 Div. 25

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
INTERPRETATION OF THE ANOMALOUS SURFACE REFLECTION OF X RAYS,
by B. E. Warren and J. S. Clarke. 24 Jun 64, 1p
Contract DA36 039AMC03200E
Unclassified report

Pub. in Journal of Applied Physics (U.S.) v36 n1 p324-5 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*X rays, Reflection), (*Reflection, X rays), Scattering, Surface properties, Mirrors.

AD-613 113 Div. 25

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PENETRATION OF AN ION THROUGH A MONOLAYER OF SIMILAR IONS ABSORBED ON A METAL,
by J. W. Gadzuk and E. N. Carabateas. 17 Jul 64, 4p
Contracts DA36 039AMC03200E, AF33 615 1083
Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n2 p357-60 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Monomolecular films, Penetration), (*Ions, Penetration), (*Gases, Adsorption), (*Adsorption, Refractory metals), Cesium, Tungsten, Work functions, Mobile, Films.

A fractional monolayer film of ions is formed by the adsorption of a gas onto a metal substrate. These ions form a discrete dipole layer, the potential across it being the change in electron work function of the surface. As additional ions are brought to the surface, they penetrate only a fraction f of the potential across the dipole layer. In this work the penetration coefficient f valid for the entire range of coverages is derived for two limiting types of films, immobile and mobile. By considering thermal effects, a penetration coefficient for partially mobile films is also derived. The values obtained for the penetration coefficient are applicable to any substrate-adsorbate system. The theoretical expressions for the penetration coefficient are evaluated for cesium on tungsten and compared with the data of Taylor and Langmuir. (Author)

AD-613 118 Div. 25, 17

California Univ., Berkeley.
CYCLOTRON RESONANCE IN ALUMINUM,
by D. N. Langenberg and T. W. Moore. 15 Jun 59, 2p
Contract AF49 638 600
AFOSR 3411
Unclassified report

Pub. in Physical Review Letters (U. S.) v3 n3 p137-8 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aluminum, Cyclotron resonance phenomena), (*Cyclotron resonance phenomena, Aluminum), Single crystals, Cryogenics, Superhigh frequency, Measurement, Absorption, Microwave spectroscopy, Magnetic fields.

An investigation was made of cyclotron resonance in a single-crystal sample of aluminum at 24 kMc/sec and 4.2K. The results indicate the presence of two distinct groups of carriers with properties consistent with the theoretical analysis of Heine. Changes in power absorption in the sample were observed using a standard microwave reflection spectrometer. Both absorption and absorption-derivative measurements were made, the latter using magnetic field modulation.

AD-613 119 Div. 25

Stanford Univ., Calif.
OFF-DIAGONAL LONG-RANGE ORDER AND PERSISTENT CURRENTS IN A HOLLOW CYLINDER,
by F. Bloch. 3 Sep 64, 9p
Contracts Nonr225 19, Nonr225 75 Unclassified report

Pub. in Physical Review (U. S.) v137 n3A pA787-95
1 Feb 65 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Superconductivity, Charged particles), (*Charged particles, Superconductivity), Bosons, Fermions, Cylindrical bodies, Quantum statistics, Statistical functions, Matrix algebra.

Some properties of the reduced density matrix are considered in their general relation to the current produced by a system of charged particles in a thin-walled long cylinder. The common connection of persistent currents and off-diagonal long-range order to the velocity distribution function will be particularly stressed. Essential features of this function, characteristic for the superconducting state, are discussed and exemplified by applying an analogous procedure to the case of boson and fermion systems. (Author)

AD-613 126 Div. 25, 17

Northwestern Univ., Evanston, Ill.
OSCILLATORY MAGNETORESISTANCE IN GRAY TIN,
by E. D. Hinkley and A. W. Ewald. 10 Jan 64, 8p
Technical rept. no. TR-7
Contract Nonr122806, Proj. NR015 219
Unclassified report

Pub. in Physical Review (U. S.) v134 n5A pA1261-7
Jun 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Tin, Magnetic properties), Semiconductors, Cryogenics, Resistance (Electrical), Single crystals, Oscillation, Impurities, Electron transitions, Atomic energy levels.

The oscillatory component of magnetoresistance has been measured for single crystals of n-type gray tin at liquid-helium temperatures. The period of oscillation is independent of magnetic field direction, confirming an isotropic effective mass and, therefore, a conduction-band edge at the center of the Brillouin zone. Oscillations were also observed in a polycrystalline specimen. Carrier concentrations deduced from the oscillatory period are in reasonably good agreement with values obtained from the Hall coefficient over a range of almost two orders of magnitude in this parameter. An electron effective mass of 0.024 m sub o was obtained from the field and temperature dependence of the oscillatory amplitude for samples having carrier concentrations on the order of 10 to the 16 power/cu cm. Nonthermal damping of the oscillations is attributed mainly to inhomogeneities in the impurity distribution. The experimental results are compared with theory. (Author)

AD-613 137 Div. 25

Massachusetts Inst. of Tech., Cambridge.
PRODUCTION AND DISSIPATION OF MAGNETIC ENERGY BY DIFFERENTIAL FLUID MOTIONS,
by Alfred Clark, Jr. 16 Mar 64, 7p
Unclassified report

Pub. in Physics of Fluids (U. S.) v7 n8 p1299-1305
Aug 1964 (Copies not available to DDC or Clearinghouse customers).
Research supported by the National Science Foundation and the Office of Naval Research.

Descriptors: (*Magnetic fields, Fluid flow), (*Fluid flow, Magnetic fields), Magnetohydrodynamics, Stagnation point, Two-dimensional, Geometric forms, Energy, Motion, Production, Heat, Mathematical analysis.

An exact solution is given for the time-development of a magnetic field in a two-dimensional stagnation flow, with the field lines being in the plane of the flow and parallel to the stagnation plane. The solution is given for an arbitrary initial field, and several examples are discussed in detail. The flow tends to increase magnetic energy by stretching the field lines and also tends to accentuate spatial inhomogeneities of the field by compressing the length scale in a direction perpendicular to the stagnation plane. The results show that the combination of these two effects can lead to exceptionally high rates of dissipation of magnetic energy by Joule heating. (Author)

AD-613 146 Div. 25

California Univ., Los Angeles.
THEORY OF A CONFIGURATIONAL EMF,
by Marvin Chester. 24 Sep 63, 9p
Unclassified report

Pub. in Physical Review (U. S.) v133 n4A pA907-15
Feb 17 1964 (Copies not available to DDC or Clearinghouse customers)
Supported in part by the Office of Naval Research.

Descriptors: (*Electric fields, Voltage), (*Voltage, Electric fields), Configuration, Electron density, Electric currents, Integral equations, Electrical engineering.

A configuration emf refers to an electrical manifestation in the electron gas of the analog of the Bernoulli effect for fluid flow. A theoretical account of this phenomenon is given. The object of the theory is to present a description of the effect from first principles which in this instance is taken as the Boltzmann transport equation. The transport equation is solved for a two-band (holes and electrons) Fermi particle system. The solutions are carried beyond first order so as to exhibit the effect. It is shown that the form of the emf is, indeed, extractable from the Boltzmann equation. And its magnitude is obtained in terms of a coefficient C for which a formula is given in terms of familiar current carrier parameters. (Author)

AD-613 147 Div. 25

California Univ., Berkeley.
EFFECT OF MAGNETIC IMPURITIES ON THE DENSITY OF STATES OF SUPERCONDUCTORS,
by Michael A. Woolf and F. Reif. 17 Aug 64, 8p
Unclassified report

Pub. in Physical Review (U. S.) v137 n2A pA557-64
Jan 18 1965 (Copies not available to DDC or Clearinghouse customers)
Research supported in part by the Office of Naval Research.

Descriptors: (*Superconductors, Impurities), Magnetic materials, Density, Films, Gadolinium, Lead, Iron, Indium, Manganese, Alloys, Electrons, Theory, Cryogenics, Tunneling (Electronics).

The technique of electron tunneling was applied to a systematic study of the density of states in superconductors containing magnetic impurities. The experiments measure directly the tunneling conductance, and hence the density of states, down to 0.4K. The present data

can therefore be compared with the predictions of the Abrikosov-Gorkov theory worked out in detail by Skalski, Betbeder-Matibet, and Weiss. Qualitatively, the addition of magnetic impurities causes a reduction of the energy gap and a broadening of the peak in the density of states. The detailed shape of the density-of-states curves agrees reasonably well with the theory, at least for a rare-earth impurity system like Gd in lead. The transition-element impurities Fe (in indium) and Mn (in lead) have a more pronounced effect than predicted, the energy gap being substantially more filled in and less well defined than in the Pb-Gd system. Experiments on pure superconducting films with superimposed layers of magnetic metal atoms yield similar marked effects on the density of states. The experiments indicate that it is the presence of strong correlations between electrons rather than the existence of a well defined energy gap which is the essential feature of the superconducting state. (Author)

AD-613 148 Div. 25

California Univ., Berkeley.
MAGNETIC PROPERTIES OF THE CANTED ANTIFERROMAGNET alpha-CoSO4,
by I. F. Silvera, J. H. M. Thornley, and M. Tinkham.
27 May 64, 16p
Unclassified report

Pub. in Physical Review (U. S.) v136 n3A pA695-710 Nov 2 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cobalt compounds, Sulfates), (*Antiferromagnetism, Cobalt compounds), (*Crystal lattices, Magnetic moments), Crystal structure, Crystal substructure, Frequency, Hamiltonian, Quantum statistics, Stability.

It is known from neutron scattering experiments that alpha-CoSO4 is a four-sublattice canted antiferromagnet with no net magnetic moment. In this paper the magnetic properties of this material are analyzed using a model in which an isotropic fictitious spin of 1/2 is assigned to each Co(++) ion. The large canting angle of 25 degrees is interpreted in terms of antisymmetric terms in the Hamiltonian due to anisotropic superexchange and the large anisotropy in the g values. Corresponding to the four sublattices, there are four spin-wave modes at k=0. Calculations indicate that the resonant frequencies of these modes should lie in the far infrared, and that only three of the modes should be observable spectroscopically. In addition, static susceptibilities of the system have been calculated for T=0 and T>>Tn(12K), and the g values were estimated. Far-infrared transmission experiments resulted in the observation of three lines at 20.6, 25.4 and 35.8 cm, with relative intensities 1:1:0.1. Although these lines are presumed to be the three expected resonances, an unambiguous fitting for all the parameters of the model has not been possible. The temperature dependence of the resonance lines is anomalous. (Author)

AD-613 149 Div. 25

California Univ., Los Angeles.
MAGNETIC RESONANCE LINEWIDTH OF GALLIUM SUBSTITUTED EuIG,
by D. E. Beeman. 3 Nov 64, 2p
Unclassified report

Pub. in Physics Letters (Netherlands) v13 n3 p194-5 Dec 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Garnet, Magnetic resonance), (*Magnetic resonance, Line spectrum), Europium compounds, Iron compounds, Gallium compounds, Silicates, Crystal lattices, Ferromagnetism.

Clogston's theory (Bell Sys. Tech -J-34:739, 1955) is extended to the case of Europium-iron garnets which have had gallium ions substituted into the iron D sites.

AD-613 151 Div. 25

Queens Coll. of the City Univ. of New York, Flushing.
THE PRINCIPLE OF EQUIVALENCE,
by A. L. Harvey. 7 Feb 64, 8p
Unclassified report

Pub. in Annals of Physics (U.S.) v29 n3 p383-90 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gravity, Theory), (*Relativity theory, Gravity), Field theory, Rotation.

The principle of equivalence is examined in its role as a test which a prospective theory of gravitation must satisfy. This point of view suggests that the commonly stipulated property of 'locality' is inherent in the gravitational field and not in the principle. The original formulation of Einstein is taken to be correct and complete. This is a 'strong' principle in the sense of Dicke. The 'weak' principle, i.e., the postulation of no more than equivalence of inertial and gravitational mass, can be satisfied by theories which predict a smaller gravitational acceleration for a rotating than for a non-rotating object. Consequently, only the strong form can be considered to be acceptable. The situation is illustrated by application (due originally to Einstein) to the first theory of Nordstrom, a simple, special relativistic generalization of Newtonian theory, and the general theory of relativity. (Author)

AD-613 156 Div. 25, 4

Texas Univ., Austin.
SEARCH FOR MAGNETORESISTANCE IN SODIUM-AMMONIA SOLUTIONS,
by D. S. Kyser and J. C. Thompson. 23 Apr 64, 2p
Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n4 p1162 Aug 15 1964 (Copies not available to DDC or Clearinghouse customers).
Research supported by Office of Naval Research, Washington, D. C.

Descriptors: (*Sodium, Magnetic properties), (*Ammonia, Magnetic properties), (*Magnetic properties, Resistance (Electrical)), Alternating current, Frequency, Temperature, Mercury, Tunneling (Electronics).

The resistance of a long cylindrical Na-NH3 sample was measured using an alternating sample current of 100-10 000 Hz and up to 0.3A, and a static transverse magnetic field up to 0.7 Wb/sq. m. A small variation in resistance was noted under certain conditions. This variation was found to be quadratic in the field and independent of sample current. The following factors were found to increase the effect: decreasing the frequency of the sample current; decreasing the concentration; increasing the temperature; and increasing the sample diameter. The maximum effect observed was about 1% change in the resistance of a 4-mole % solution at -37C, in a cell with 2 mm i.d., and in a magnetic field of 0.7 Wb/sq. m.

The observed effect is thought to be the result of eddy currents in the liquid. The 'true' magneto-resistance, corresponding to microscopic processes, is the small sample limit, and is less than 0.05% over the concentration range of 4% to 13% sodium in the highest field. (Extracted)

AD-613 157 Div. 25, 4

Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
FOCUSING AND ORIENTATION OF SYMMETRIC-TOP MOLECULES WITH THE ELECTRIC SIX-POLE FIELD, by K. H. Kramer and R. B. Bernstein. 15 Sep 64, 4p
Contract AT11 1 1328; Grant NsG275 62
Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v42 n2 p767-70 Jan 15 1965 (Copies not available to DDC or Clearinghouse customers).

Research partly supported under subcontract from Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md., Contract NOw62 0604c.

Descriptors: (*Molecular beams, Focusing), Electric moments, Molecular spectroscopy, Dipole moments, Electric fields, Vector analysis, Electrodes, Halogenated hydrocarbons, Iodine compounds.

The electric six-pole field is employed for focusing of beams of symmetric-top molecules via the first-order Stark effect. Molecules capable of a specified degree of orientation of dipole moment with respect to an electric-field vector can be selected according to the voltage applied to the electrodes of the six-pole field. The rotational angular momentum of the focused molecules can also be well aligned with the field. Experiments with CH_3I, and CHI_3, prolate and oblate tops, were carried out to illustrate the method. (Author)

26. Production and Management

AD-612 461 Div. 26, 8
CFSTI Prices: HC$1.00 MF$0.50

Air Force Weapons Lab., Kirtland AFB, N. Mex.
A UNIQUE TECHNIQUE FOR CUTTING GUARD-RING GROOVES IN QUARTZ CRYSTALS.
Rept. for Jul-Nov 64,
by Richard D. Thomas. Feb 65, 18p
Rept. no. WL-TR-64-171
Proj. 5710, Task 15 018

Unclassified report

Descriptors: (*Quartz, Abrasive blasting), (*Abrasive blasting, Piezoelectric crystals), (*Piezoelectric crystals, Abrasive blasting), Rings, Transducers, Manufacturing methods, Abrasives.

The quartz-crystal transducer has found wide application in measuring pressure profiles of shock waves in solid materials. When using the quartz crystal in this manner, it is necessary to separate the positive plated surface to form two electrodes. This is done by cutting a narrow concentric groove in the surface. The method described in this report is believed to surpass any known method in the conservation of both material cost and man-hours. This technique produces a groove with a width between 0.003 inch and 0.005 inch and concentric within 0.0005 inch over the entire diameter. (Author)

AD-612 480 Div. 26
CFSTI Prices: HC$4.00 MF$0.75

Westinghouse Electric Corp., Pittsburgh, Pa.
STUDY OF THE FEASIBILITY OF APPLYING ULTRASONIC ENERGY TO THE ROLLING PROCESS FOR SHEET METALS.
Final rept.,
by James W. Cunningham and Ronald J. Lanyi.
15 Mar 65, 115p
Contract NOw64 0294J

Unclassified report

Descriptors: (*Ultrasonic radiation, Rolling (Metallurgy)), (*Rolling (Metallurgy), Ultrasonic radiation), Sheets, Metals, Vibration, Transducers, Rolling mills, Sound, Stresses, Mathematical analysis, Loading (Mechanics).

The application of 10 to 20 kc acoustic energy during the rolling of metal sheet was investigated. The considerable theoretical potential of both the volume and surface contributions of ultrasound to rolling is described, particularly with respect to sheet thickness. The importance of the relative directions of vibrational displacement, deformation force and metal flow is pointed out. A series of rolling experiments in which a magnetostrictive transducer was attached to the workpiece is described, and load reductions on the order of 5% attained during these experiments related to the acoustic parameters. A roll design incorporating an ultrasonic transducer in the interior of the roll was formulated and constructed. The extensive electromechanical problems encountered during roll construction are described. These problems were only partially solved and the resultant rolls had a very short life, although load reductions of 5% were obtained on several materials. (Author)

AD-612 490 Div. 26, 17
CFSTI Prices: HC$2.00 MF$0.50

Defense Metals Information Center, Columbus, Ohio.
DEPARTMENT OF DEFENSE REFRACTORY METALS SHEET ROLLING PROGRAM.
Status rept. no. 3, Jun 62-1 Nov 64,
by D. J. Maykuth. 26 Jan 65, 43p Rept. no. DMIC-212
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Tungsten, Sheets), (*Refractory metal alloys, Sheets), (*Sheets, Rolling (Metallurgy), (*Rolling (Metallurgy), Heat-resistant metals and alloys), Mechanical properties, Heat treatment, Powder metallurgy, Joining, Processing, Niobium alloys, Tungsten alloys, Zirconium alloys, Carbon alloys, Molybdenum alloys, Vanadium alloys, Tantalum alloys, Hafnium alloys, Rhenium alloys.

This report is the third of a series which will periodically summarize the status of the various contracts involved in the Department of Defense Refractory Metals Sheet Rolling Program. Under this program, selected candidate materials are being carried through one or more of the following consecutive phases: Phase I, development of a sheet-production practice; Phase II, establishment of minimum design data; and Phase III, evaluation of sheet-fabrication characteristics. To the present time, 13 contracts have been funded or planned in support of the Phase I, II, and III activities. This report summarizes the status of each of these individual contracts as of November 1, 1964. The first section describes the overall program of the Department of Defense Refractory Metals Sheet Rolling Program. Following, in the order of their discussions, are sections dealing with fabricable molybdenum alloys, unalloyed tungsten, columbium alloys, and tantalum alloys. (Author)

AD-612 600 Div. 26, 8
CFSTI Prices: HC$1.00 MF$0.50

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING PROCESS AND EQUIPMENT FOR CONSTRUCTION OF ELECTRON-TUBE MOUNTS.
Quarterly progress rept. no. 9, 1 Jul-30 Sep 64,
by J. G. Thomas. 30 Sep 64, 20p
Contract DA36 039sc86741

Unclassified report

See also AD-609 935.

Descriptors: (*Welding, Ultrasonic radiation), (*Electron tubes, Welding), (*Ultrasonic radiation, Welding), Electron tube parts, Manufacturing methods, Electric connectors, Tungsten alloys, Rhenium alloys, Molybdenum, Nickel alloys, Tungsten, Sheets, Welds, Wire, Chromium alloys, Iron alloys.

All of the connections in the modified Type 6080WB electron tube have been accomplished by ultrasonic welding with a standard 600-watt welding machine, special tips and anvil tooling. The complete assembly sequence required to make the ultrasonically welded tube mount has been demonstrated. Welding investigations with molybdenum wire wound frame grids have been limited to tooling design studies. Welding studies which involve ultrasonic bonding of 0.003-inch diameter tungsten-3 rhenium wires to molybdenum, tungsten, and nickel in 0.060-inch flat sheet are progressing satisfactorily, and final samples for shock and vibration testing will be prepared after minor welder tooling modifications such as grooving of tip and substitution of tip material from tool steel to Udimet 700 are completed. (Author)

AD-612 640 Div. 26, 17
CFSTI Prices: HC$5.00 MF$1.00

Western Gear Corp., Lynwood, Calif.
HIGH ENERGY RATE FORGING DEVELOPMENT.

Final technical rept. for Jan 61-Sep 64,
by F. L. Parkinson. Nov 64, 162p
Rept. no. 6410-230
Contract AF33 600 42523, Proj. TR7 866
ML TR-64-371

Unclassified report

See also AD-608 314.

Descriptors: (*Explosive forming, Forging), (*Titanium alloys, Forging), (*Steel, Forging), (*Molybdenum alloys, Forging), (*Tungsten, Forging), Aluminum alloys, Vanadium alloys, Nickel alloys, Carbon alloys, Tensile properties, Metallography, Tolerances (Mechanics), Microstructure, Hardness, Dies, Surface properties, Mechanical properties.

A manufacturing process has been developed to produce no-draft, close tolerance forgings with difficult web sections and large material upset ratios by high energy rate forging (HERF) for a wide range of materials. Configurations were: a no-draft two legged bracket, a web and rib scissor configuration, a rocket nozzle preform, and a thin webbed circular section. Materials successfully forged into complex shapes were AISI 4340, H-11 tool steel, Ti-6A1-4V, PH 15-7 Mo Stainless Steel, TZM Molybdenum alloy and unalloyed tungsten. Upset forgings of all above materials were produced in order to establish optimum forging parameters. Pilot production lots were run of the thin rim and web configuration using AISI 4340 and H-11 tool steel in order to demonstrate the reproducibility of the HERF process. The mechanical and metallurgical properties of the as-forged parts were determined. Excellent grain flow patterns were achieved in all the configurations employed. The wrought refractory metals were found to be much superior to the arc-cast pressed and sintered material of the same composition. When tensile shear stresses were applied to the material under the optimum forging conditions, the wrought material was vastly superior. However, both materials performed well only under compressive loading. (Author)

AD-612 645 Div. 26
CFSTI Prices: HC$3.00 MF$0.75

Case Inst. of Tech., Cleveland, Ohio.
OPTIMAL FINISHED GOODS INVENTORY POLICY FOR A FIRM,
by Kenneth Goudreau. 1965, 61p
Contract Nonr114111

Unclassified report

Descriptors: (*Management control systems, Inventory), (*Inventory control, Mathematical models), (*Management engineering, Inventory control), Inventory analysis, Industrial production, Costs, Storage, Simulation, Computers, Operations research.

A study is made of the production and inventory system of a small industrial firm. A mathematical model is developed to describe the relationship between average levels of finished goods inventory of each of fifty different products and corresponding levels of customer service. Customer service is measured by the percentage of orders that are back-ordered more than a specified length of time. The objective is minimization of total expected cost of carrying inventory for a specified level of customer service. The model includes the factors of limited production capacity, rate of production, variable demand, the cost of carrying inventory, and waiting time duration of backorders. The behavior of the inventory control system is simulated by means of a computer and conclusions are drawn on the basis of the results of that simulation. (Author)

AD-612 676 Div. 26, 15
CFSTI Prices: HC$2.00 MF$0.50

Assistant Secretary of Defense (Installations and Logistics), Washington, D. C.
STATISTICAL THEORY AND METHODS FOR VALIDATING RESULTS OF SAMPLING INSPECTION BY ATTRIBUTES.
Quality Control and Reliability rept.,
by Henry Ellner. 16 Apr 62, 42p
Technical rept. no. TR-5

Unclassified report

Descriptors: (*Quality control, Statistical tests), (*Statistical tests, Quality control), Reliability, Industrial production, Military requirements, Probability, Statistical processes, Acceptability.

Simple but robust statistical methods are described and developed for use in validating suppliers' inspection records of attribute sampling data. The methods are essentially two-sample significance tests for homogeneity of discrete variates treated as continuous, and the combination of their probabilities to test the hypothesis of over-all agreement of paired inspection results. The statistical theory and techniques presented in this paper form the basis for DoD Handbook H109, 'Statistical Procedures for Determining Validity of Suppliers' Attributes Inspection.' The procedures of the handbook constitute a system of product verification inspection wherein the consumer's sampling results establish the reliability of the supplier's acceptance sampling records and provide independent estimates of the quality of product submitted for acceptance. The characteristics and application of alternate tests are discussed. Utilization of the power function of the significance tests affords substantial reduction in the amount of product verification inspection. (Author)

AD-612 720 Div. 26, 9, 15
CFSTI Prices: HC$2.00 MF$0.50

Ampex Corp., Redwood City, Calif.
DERIVATION OF GOVERNING EQUATIONS FOR SELF-ACTING FOIL BEARINGS,
by Edward J. Barlow. Feb 65, 32p Rept. no. RR-65-1
Contract Nonr381500X, Proj. NR062 297

Unclassified report

Descriptors: (*Gas bearings, Numerical analysis), (*Partial differential equations, Gas bearings), Gas flow, One-dimensional flow, Nonlinear differential equations, Lubrication, Stresses, Deflection, Films.

Contained is the derivation of the equations for the self-acting foil bearing. These equations include the effects of bending stiffness of the tape and of compressibility of the lubricant. They are nonlinear, and the boundary conditions are divided equally between the two ends of the tape. These complications even make obtaining numerical solutions difficult. Linearized solutions are derived for large wrap angles neglecting the bending stiffness of the tape. (Author)

AD-612 794 Div. 26, 17
CFSTI Prices: HC$0.50 MF$0.50

Army Materials Research Agency, Watertown, Mass.
THE INFLUENCE OF SUBZERO ROLLING ON THE TENSILE PROPERTIES OF COMMERCIALLY PURE TITANIUM.
Technical rept.,
by Thomas S. DeSisto and Frank L. Carr.
Dec 64, 21p Rept. no. AMRA-TR-64-47
Proj. 1A010501B010, Task 35185

Unclassified report

Descriptors: (*Titanium, Rolling (Metallurgy), (*Rolling (Metallurgy), Titanium), (*Low-temperature research, Rolling (Metallurgy)), Tensile properties, Hardening, Cold working, Ductility, Strain (Mechanics), Deformation.

Commercially pure titanium was rolled at room temperature and -105, -240, and -320 F for various amounts of reduction to 40 percent. Tension tests of these cold-worked materials were performed from room temperature to -320 F. Increased strength with increased retained true strain at fracture was obtained by selected deformation-temperature cycles. Log-log plots of the flow data of the starting material showed two segments differing in slope, rather than one straight line as predicted by the power law. The strains at which the inflection occurred decreased with decreasing testing temperature, while increasing amounts of reduction and decreasing rolling temperatures moved these points of inflection to higher strains. The inflection points are attributed to a change in deformation mechanisms from slip to twinning. The slopes of the two segments also decreased with both increasing reductions and decreasing rolling temperature. (Author)

AD-612 802 Div. 26, 12
CFSTI Prices: HC$3.00 MF$0.75

Army Missile Command, Redstone Arsenal, Ala. Directorate of Procurement and Production.
PAMPER: PRACTICAL APPLICATION OF MID-POINTS FOR EXPONENTIAL REGRESSION.
4 Jan 65, 97p

Unclassified report

Descriptors: (*Quality control, Statistical data), Procurement, Tables, Algebra, Statistical analysis, Acceptability.

The tables in the brochure are designed for a rapid as well as a reliable means of estimating algebraic lot mid-points. If the proper procedure is followed, the mid-point gained from using the tables will differ at most one and a half percent from the calculated or true algebraic lot mid-point. In most cases the mid-point gained using the Pamper Tables is identical to the calculated algebraic lot mid-point. The differences in using the Pamper mid-points and the calculated or true algebraic mid-points in the calculations of experience curves is insignificant.

AD-612 904 Div. 26
CFSTI Prices: HC$1.00 MF$0.50

Oklahoma State Univ., Stillwater. Dept. of Mechanical Engineering.
FATIGUE IN ACTUATORS.
Final rept.,
by R. E. Little and C. Bacgi. 1956, 9p
Contract AF34 601 17361

Unclassified report

Descriptors: (*Hydraulic actuators, Fatigue (Mechanics)), (*Fatigue (Mechanics), Hydraulic actuators), Stresses, Failure (Mechanics), Test methods.

This report covers proposed changes to mitigate fatigue problems in actuators. It also suggests studies and tests relevant to increasing design integrity. Fatigue failure exhibits supplied by OCAMA show that these actuators were not designed to withstand fatigue loading. Consequently, fatigue problems will increase as time passes unless a significant preventative program is undertaken. (Author)

AD-612 913 Div. 26, 14
CFSTI Prices: HC$3.00 MF$0.75

California Univ., Berkeley. Metal Processing Lab.
VISIOPLASTICITY.
Final rept.,
by E. G. Thomsen. Feb 65, 83p
Contract NOw64 0070d

Unclassified report

See also AD-609 949.

Descriptors: (*Test methods, Deformation), (*Material forming, Metals), (*Deformation, Test methods), Strain (Mechanics), Stresses, Velocity, Extrusion, Programming (Computers), Surface properties, Power series, Numerical analysis, Loading (Mechanics), Plasticity, Metallography, Boundary value problems, Rolling (Metallurgy), Transformations, Least squares method.

The effort of the present investigation has taken two directions: (1) to perfect the visioplasticity method for getting steady-state streamlines by using coordinate-measuring machines to obtain data, which are then processed by application of a computer; and (2) to reanalyze potential theory in an attempt to discover by comparison with experiments if a theoretical solution for flow theories is possible. The visioplasticity techniques permitted the attainment of steady-state streamlines and some data were processed to yield velocities, strain rates and finite strain for extrusion problems. The programs are written in such a way that they may be applied to other die configurations. Thus, it is expected that the reduction of data will be accelerated greatly once all the programs are complete. The theoretical analyses appear to show that the solution of an equivalent problem of a modified boundary shape obtained from the potential theory results in a flow net that is the best approximation to the actual flow net. This obtained solution is unique and complete. It is expected that a potential theory will be useful in rolling problems. (Author)

AD-613 025 Div. 26, 17
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Electric Corp., Pittsburgh, Pa.
STUDY OF THE FEASIBILITY OF APPLYING ULTRASONIC ENERGY TO THE ROLLING PROCESS FOR SHEET METALS.
Progress rept. no. 4, Aug-Dec 64,
by James W. Cunningham and Ronald J. Lanyi.
Dec 64, 28p
Contract NOw64 0294J

Unclassified report

See also AD-612 480.

Descriptors: (*Rolling (Metallurgy), Ultrasonic radiation), (*Ultrasonic radiation, Rolling (Metallurgy)), Transducers, Rolling mills, Feasibility studies, Material forming, Heat exchangers, Tolerances (Mechanics), Loading (Mechanics), Sheets, Vibration, Thermal stresses, Resonance, Lead, Aluminum, Copper, Steel, Performance (Engineering).

A transducerized roll was successfully fabricated and installed in the rolling mill. Using a heat exchanger to prevent transducer heating, radial surface displacements of .00006 to .00008 inches at a frequency of 12 KC/S could be continuously maintained during rolling. Load reductions of 5% to 16% were obtained while rolling lead at room temperature and aluminum at 500C. No significant effect was observed on copper or steel or aluminum at room temperature. A new roll is being constructed

utilizing improved design features and will be compared with the older roll and used in conjunction with it to provide a mill operating with two transducerized rolls. (Author)

AD-613 032 Div. 26, 5, 7
CFSTI Prices: HC$2.00 MF$0.50

Rotron Mfg. Co., Woodstock, N. Y.
THE DEVELOPMENT OF A GAS LUBRICATED BEARING BLOWER ASSEMBLY FOR USE IN AN AN/TED-9 RADIO TRANSMITTER.
Interim development rept. for 3 Nov 64-2 Feb 65.
2 Feb 65, 36p
Contract NObsr87522

Unclassified report

See also AD-610 995.

Descriptors: (*Gas bearings, Design), (*Thrust bearings, Gas bearings), (*Journal bearing, Gas bearings), (*Radio transmitters, Gas bearings), Blowers, Electric motors, Magnetic properties, Performance (Engineering), Loading (Mechanics), Magnets.

A modification to the present contract has resulted in a change in program objectives regarding the gas lubricated blower to be developed. In lieu of cooling an AN/SRT-15 transmitter, a blower will be developed for cooling an AN/TED-9 transmitter. Transmitter evaluations have commenced to establish the design parameters for the gas bearing blower and electronic converter package. Test rig investigations have been conducted to determine the effect of bearing geometry variations on the bearing performance of a cylindrical journal bearing. Several evaluations were also conducted on repulsive type permanent magnet thrust bearings. (Author)

AD-613 062 Div. 26
CFSTI Prices: HC$2.00 MF$0.50

Materials Advisory Board, NAS-NRC, Washington, D. C.
METALWORKING PROCESSES AND EQUIPMENT.
Progress rept. no. 1.
15 Mar 65, 32p MAB-206-M, rev.
Contract SD118

Unclassified report

Descriptors: (*Material forming, Vibration), (*Extrusion, Hydrostatic pressure), (*Deformation, Metals), Plasticity, Refractory metals, Nickel alloys, Cobalt alloys, Steel, Titanium, Beryllium, Mechanical properties.

The government Metalworking Processes and Equipment Program is a cooperative effort of the Military Services and National Aeronautics and Space Administration to support studies of deformation theory which will lead to the improvement of manufacturing technology. At the request of the Department of Defense the Materials Advisory Board Committee on Metalworking Processes and Equipment is assisting in the planning and technical phases of the program. The committee has assessed the potential of vibrational energy technology and hydrostatic extrusion which were the subjects of recent government-sponsored symposia, and have submitted conclusions and recommendations as to the value and limitations of these processes and the manner in which the development of each should be undertaken. A study of superplasticity phenomena was initiated by the Committee. (Author)

AD-613 101 Div. 26, 4, 20

Litton Systems, Inc., Minneapolis, Minn. Applied Science Div.
ENERGY DISTRIBUTION OF SPUTTERED Cu ATOMS,
by R. V. Stuart and G. K. Wehner. 2 Dec 63, 6p
Contract Nonr158915

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n6 p1819-1824 Jun 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sputtering, Copper), (*Copper, Sputtering), Atoms, Ion bombardment, Mercury, Helium group gases, Secondary emission, Atomic energy levels, Test methods, Test equipment, Copper coatings.

Energy distributions were obtained for atoms sputtered from Cu (100), (110), (111), and polycrystalline surfaces bombarded by 80- to 1200-eV Hg and noble gas ions. Energies of sputtered atoms were found to depend markedly on the angle of ejection. For a (110) surface bombarded by 1000-eV Kr ions, average energies of ejected atoms are 9.5 eV in the (110) direction (normal to the surface) and 14.2 eV in the (011) direction (60 degrees to the surface normal). Ejection energies decrease for lighter ions in the order Kr(+), Ar(+), Ne(+), and He(+). For a (110) surface bombarded by 600-eV He ions, the average energy of atoms ejected in the (110) direction is 5.5 eV. Dependence on bombarding ion energy is very weak above 1000 eV where average energies of sputtered atoms are found to be in the range 5-15 eV. Ejection energies decrease at lower bombarding ion energies and decrease rapidly below 200 eV. For atoms ejected in the (110) direction from a (110) surface under Kr ion bombardment, the average energy decreases from 5.5 eV at an ion energy of 200 eV to 2.6 eV at an ion energy of 80 eV. (Author)

AD-613 130 Div. 26, 18, 32

RAND Corp., Santa Monica, Calif.
SIMULATION AND LONG-RANGE PLANNING FOR RESOURCE ALLOCATION,
by Robert M. Rauner and Wilbur A. Steger. 1962, 28p
P-2223-1

Unclassified report

Pub. in Quarterly Journal of Economics (U. S.) v76 p219-45 May 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Logistics, Management planning), (*Management planning, Logistics), (*Economics, Logistics), Air Force operations, Simulation, Weapon systems, Operations research, Computers.

The problem of allocating productive resources to attain some predetermined objective is studied in Air Force logistics organizations. In this paper is described a major Laboratory simulation that was conducted several years ago. Although the primary objective of the simulation was to obtain results useful to Air Force planners, it is believed that the research method may be of interest to economists more generally.

AD-613 141 Div. 26, 30

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
CHARACTERISTICS OF PHOTOGRAPHIC EMULSIONS FOR ELECTRON MICROSCOPY,
by E. Zeitler, P. Sadhukhan, and G. F. Bahr. 17 Aug 64, 1p

Unclassified report

Pub. in Optical Society of America (U.S.) v55 n2 p204-5

Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electron microscopy, Photographic emulsions), (*Photographic emulsions, Sensitivity), Photographic grain, Electron beams, Voltage, Test methods.

The communication describes results of preliminary measurements of the grains/electron yield. The number of electrons incident per unit area of the photographic emulsion was measured and the number of developed grains per unit area was counted, for different accelerating voltages, different photographic emulsions, and different developers. (Author)

27. Propulsion Systems

AD-612 646 Div. 27, 17
CFSTI Prices: HC$3.00 MF$0.75

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STEELS FOR SOLID-PROPELLANT ROCKET-MOTOR CASES,
Rept. for Jul-Oct 64,
by Isaac Perlmutter and Vincent DePierre.
Jan 65, 76p Rept. no. ML-TR-64-356
Proj. 7351, Task 735105
Unclassified report

See also AD-292 258.

Descriptors: (*Rocket cases, Steel), (*Steel, Rocket cases), Rocket motors (Solid propellant), Nickel alloys, Chromium alloys, Molybdenum alloys, Carbon alloys, Cobalt alloys, Martensite, Maraging steels, Deformation, Fracture (Mechanics), Toughness, Welding, Metallurgy.

Strength requirements for solid propellant motor cases (or chambers) are reviewed and the potential gains in performance achieved by reducing weight of inert components are discussed. It is shown that substantial improvements in strength/density ratio of booster stage material are required to effect appreciable gains in performance (velocity, payload). Weight savings are much more significant when achieved in the upper stages of a rocket system than in the booster (launch) stage. Considering the case as a pressure vessel a comparison is made between titanium alloys, aluminum alloys, a composite material (fibre glass filament winding), and alloy steels on the basis of a case optimized for resistance to internal pressure (hoop stresses) and external buckling loads. Three classes of alloy steel are comprehensively discussed in order of increasing balance between yield strength and fracture toughness. The members of Group I, the low alloy medium carbon (.35-.45C) martensitic steels, are compared with each other on the basis of the yield strength-fracture toughness relations. The second class of steels (Group II) consists of the low carbon (.25%C) alloy martensites. The metallurgical design of these alloys (9 Nickel-4 cobalt) is reviewed, and their improved balance fracture toughness and yield strength is discussed.

AD-612 657 Div. 27, 14
CFSTI Prices: HC$1.00 MF$0.50

Atlantic Research Corp., Alexandria, Va.
BEHAVIOR OF NOZZLE MATERIALS UNDER EXTREME ROCKET MOTOR ENVIRONMENTS.
Quarterly progress rept. no. 3, Nov 64-Jan 65,
by J. D. Batchelor. Mar 65, 21p
Contract NOw64 0393c
Unclassified report

Descriptors: (*Rocket motor nozzles, Materials), (*Graphite, Rocket motor nozzles), (*Carbides, Rocket motor nozzles), Plasma medium, Laboratory furnaces, Environmental tests, Pipes, Refractory materials, Refractory coatings, Hafnium compounds, Niobium compounds, Erosion, Test methods, Pyrolytic graphite, Chemical reactions, High-temperature research, Nitrogen, Carbon dioxide, Hydrogen, Water.

During the third quarterly period of the program, experimental reaction studies were continued using the two techniques with the plasma torch heat source. The test technique which exposes the bore of a tubular specimen to a high heat flux and a high velocity of selected gas mixtures was used with graphite, HfC and NbC specimens. This technique has become the preferred means of studying chemical reactions. A good number of specimens of each of the four refractory carbides under investigation has been received from Carborundum and work is continuing on these materials. The plasma torch impingement test method was used in an attempt to obtain data from pyrolytic graphite coated specimens comparable to data published previously for other graphites. Detailed microscopic examination of both types of specimens was started to improve the understanding of the attack mechanism. (Author)

AD-612 783 Div. 27, 9, 12
CFSTI Prices: HC$1.00 MF$0.50

Southwest Research Inst., San Antonio, Tex.
APPLICATION OF SIMILITUDE THEORY TO THE PROBLEM OF FUEL SLOSHING IN RIGID TANKS,
by H. Norman Abramson, R. J. Martin, and Guido E. Ransleben, Jr. 23 May 58, 18p
Technical rept. no. TR-1
Contract DA23 072ORD1251, Proj. 43 768 2
Unclassified report

Descriptors: (*Sloshing, Fuel tanks), (*Fuel tanks, Sloshing), (*Liquid rocket fuels, Sloshing), Models (Simulations), Trajectories, Flight paths, Acceleration, Stresses, Structural parts, Design, Viscosity, Stability, Mathematical analysis.

Similitude theory is applied to the problem of fuel sloshing in accelerated tanks to establish criteria for the design of model experiments. It was found that dynamic modeling is possible even if liquid viscosity is considered. The ranges of significant parameters and the selection of model liquids are discussed. (Author)

AD-612 784 Div. 27, 9, 12
CFSTI Prices: HC$2.00 MF$0.50

Southwest Research Inst., San Antonio, Tex.
SIMULATION OF FUEL SLOSHING CHARACTERISTICS IN MISSILE TANKS BY USE OF SMALL MODELS,
by H. Norman Abramson and Guido E. Ransleben, Jr.
20 Mar 59, 46p Technical rept. no. TR-3
Contract DA23 072ORD1251, Proj. 43 768 2
Unclassified report

Descriptors: (*Sloshing, Fuel tanks), (*Fuel tanks, Sloshing), (*Liquid rocket fuels, Sloshing), Models (Simulations), Model tests, Guided missiles, Force (Mechanics), Test facilities, Damping, Trajectories, Flight paths, Motion, Viscosity, Acceleration, Standards.

Similitude theory is applied to the problem of fuel sloshing in accelerated tanks to establish criteria for the design of model experiments. It is found that dynamic modeling is possible even if liquid viscosity is considered, and the ranges of significant parameters and the selection of model liquids are discussed. The results of experiments made on small models are compared with those obtained on full-scale tanks, for two different types of damping devices. (Author)

AD-612 785 Div. 27, 9, 12
CFSTI Prices: HC$2.00 MF$0.50

Southwest Research Inst., San Antonio, Tex.
SOME STUDIES OF A FLOATING LID TYPE DEVICE FOR SUPPRESSION OF LIQUID SLOSHING IN RIGID CYLINDRICAL TANKS,

by H. Norman Abramson and Guido E. Ransleben, Jr.
1 May 61, 41p Technical rept. no. TR-10
Contract DA23 072ORD1251, Proj. 43 768 2
Unclassified report

Descriptors: (*Sloshing, Damping), (*Fuel tanks, Sloshing), (*Liquid rocket fuels, Sloshing), Stabilization systems, Models (Simulations), Guided missiles, Force (Mechanics), Frequency, Flight paths, Acceleration, Trajectories, Graphics.

Floating lid type devices having a diameter of 85%, or more, of the tank diameter are quite effective in providing increased damping of the peak total force response. A 67% lid provides almost no damping at all. The peak force responses with the 85% lid decreased with increasing excitation amplitude, but increase slightly with increasing equivalent Reynolds' number of the test liquid. This is accompanied by a pronounced increase in the liquid first mode resonant frequency. The forces acting directly on the lids appeared to be rather large so that such devices may well prove to involve significant weight penalties for the damping provided. (Author)

AD-612 899 Div. 27, 31
CFSTI Prices: HC$3.00 MF$0.50

Mechanical Technology, Inc., Latham, N. Y.
EXPERIMENTAL INVESTIGATION OF A STEAM LUBRICATED JOURNAL BEARING.
Summary rept.,
by J. S. Meacher. 1 Feb 65, 51p Rept. no. MTI-65TR6
Contract Nonr373100, Proj. NR062 290
Unclassified report

Descriptors: (*Journal bearings, Lubrication), (*Steam, Lubricants), (*Lubrication, Journal bearings), Tests, Loading (Mechanics), Performance (Engineering), Test methods, Test equipment, Feasibility studies, Gas bearings, Stability, Gas flow.

An externally pressurized, orifice-compensated journal bearing was tested using both nitrogen and steam as lubricant gas. Non-rotating tests were performed to determine load-deflection characteristics, stiffness and flow requirement. Performance with superheated steam, and shaft and bearing temperature equal to that of the inlet steam, was practically identical to the performance with nitrogen. Instability similar to pneumatic hammer was observed when shaft temperature was more than 10F below the inlet steam saturation temperature, using either saturated or wet steam. A minor instability of a different nature occurred when test conditions favored the condensation or accumulation of water droplets in the bearing supply manifold. The bearing was completely unstable when shaft temperatures were more than 25F below the inlet saturation temperature. The use of wet steam, saturated steam, or slightly superheated steam, while maintaining shaft temperature 10F below, at, or 10F above the inlet saturation temperature resulted in negligible differences in stiffness and load-deflection curves. Some evidence was observed that increased rates of evaporation within the bearing clearance produced slight increases in bearing stiffness. (Author)

AD-613 010 Div. 27, 14, 17
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Palo Alto, Calif.
LARGE BOOSTER WEIGHT COMPARISON, GLASS FILAMENT AND STEEL,
by Leo Schapiro, Edgar Morris, and Oscar Hoffman.
Jun 63, 28p Rept. no. 5-10-63-23
Unclassified report

Prepared for presentation at Interagency Solid Propulsion Meeting, 15-17 Jul 63, Seattle, Washington.

Descriptors: (*Rocket cases, Materials), (*Filament wound construction, Rocket cases), (*Steel, Rocket cases), (*Glass textiles, Filament wound construction), (*Rocket motors (Solid propellant), Rocket cases), Glass textiles, Cylindrical bodies, Weight, Feasibility studies, Maraging steels, Mathematical prediction, Reliability, Booster motors.

Steel and glass filaments have been the construction materials for solid propellant rocket chambers of a 3 to 6 foot diameter range producted for four missile systems. Chambers as large as 22 foot diameter currently of interest for boosting space vehicles should use the construction material that makes the boosters (1) more reliable and (2) less costly and/or minimum weight. In the absence of data on reliability and cost, weight comparison of the two construction materials is discussed in detail for (a) present size missile chambers and (b) a proposed very large booster. A booster of 260 inch diameter and 100 feet long between end dome tangency planes made from 18 NiCoMo 250 KSI yield strength steel may be expected to weigh more than a glass filament booster unless the winding problems associated with the large size are not readily solved. (Author)

AD-613 047 Div. 27, 12
CFSTI Prices: HC$4.00 MF$0.75

Brown Engineering Co., Inc., Huntsville, Ala.
Research Labs.
A COMPARATIVE ANALYSIS OF THE PERFORMANCE CAPABILITIES OF VARIOUS TYPES OF ELECTROSTATIC PROPULSION ENGINES,
by A. Lucile Cox. Feb 65, 108p
Technical note no. TN-R-136
Unclassified report

Descriptors: (*Ion engines, Space propulsion), (*Electric propulsion, Space propulsion), (*Space propulsion, Ion engines), (*Electrostatics, Ion engines), Payload, Spacecraft, Space flight, Thrust, Performance (Engineering), Space probes.

The operating characteristics of three types of atomic ion engines and three types of colloidal ion engines are evaluated. The major theoretical factors which will limit payload capacity are brought out for each type of engine. Total propulsion system masses for the production of ten pounds of thrust for 2,000 hours and for 10,000 hours of engine operation are compared. Examination of the payload capacities of the various engines for several lunar and planetary missions shows that the colloidal ion engines have a superior payload capacity for lunar missions and may be competitive with atomic ion engines for planetary missions. The specific mass of the power supply system is shown to be a much more dominant factor in determining the payload capacities of the atomic ion engines than for the colloidal ion engines. (Author)

28. Psychology and Human Engineering

AD-612 542 Div. 28

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MINIMUM DETECTABLE CHANGE IN INTERAURAL TIME OR INTENSITY DIFFERENCE FOR BRIEF IMPULSIVE STIMULI,
by J. L. Hall, II. 24 Aug 64, 3p
Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n12 p2411-13 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Auditory acuity, Auditory signals), (*Auditory signals, Auditory acuity), Psychoacoustics, Intensity, Reaction (Psychology), Reflexes, Time, Performance (Human), Graphics, Acoustics.

Psychophysical experiments to determine the just-noticeable change i interaural time difference and interaural intensity difference as a function of over-all intensity, for dichotic clicks, were performed on three subjects. Results are given. (Author)

AD-612 543 Div. 28

Defence Research Medical Labs., Toronto (Ontario).
INTERFERENCE AND DECAY IN VERY SHORT-TERM MEMORY,
by Jane F. Mackworth. Aug 64, 9p
Rept. no. DRML-RP-522
Proj. D77 94 20 46
Unclassified report

Pub. in Journal of Verbal Learning and Verbal Behavior (U. S.) v3 n4 p300-08 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Memory, Psychometrics), (*Recall, Psychometrics), Visual signals, Geometric forms, Numbers, Colors, Learning, Reading, Verbal behavior, Interference, Errors, Analysis of variance.

Four experiments were conducted comparing the effect of message length on the recall of simple and mixed messages of digits, letters, colors, and shapes, presented visually. (Thirty-five housewives served as S2). The total correct recall was inversely related to the message length, with slope independent of composition but with intercept determined by the materials presented. The amount lost due to the second kind of material in a message was related to the time taken to read this material. (Author)

AD-612 551 Div. 28

Naval Medical Research Lab., New London, Conn.
THE PSYCHOLOGICAL DIMENSIONS OF COLOR.
Rept. no. 34,
by Forrest L. Dimmick. 10 Apr 61, 10p
Rept. no. 431 v23-n6
Proj. MR005 14 1001 1
Unclassified report

Pub. in die Farbe (West Germany) v11 n1/6 p127-34 1962 (Copies available only to DDC users).

Descriptors: (*Visual perception, Colors), (*Colors, Visual perception), Reaction (Psychology), Classification, Statistical analysis, Geometric forms, Equations.

Clarification of all aspects of color requires an adequate systematization of the psychological data of color relationships, as well as their physical stimulus correlates and their physiological substrate. Such data must be based on the operational procedures of psychological methodology. Experimental results can be expressed as an equation of the form u+v+w+x=c. Quantification of the equation must be in terms of psychological units, such as just noticeable differences and equal intervals. The dimensions defined by the equation may be related to orthogonal co-ordinate systems. The multi-dimensional figure thus generated emphasizes essential interrelationships among colors.

AD-612 555 Div. 28

Defence Research Medical Labs., Toronto (Ontario).
DELAY OF RESPONSE IN THE PERCEPTION OF SLANT AND SHAPE,
by A. H. Smith. 20 Apr 64, 10p Rept. no. DRML-RP-536
Proj. D77 44 20 46
Unclassified report

Pub. in Canadian Journal of Psychology v18 n3 p235-44 1964 (Copies available only to DDC users).

Descriptors: (*Visual perception, Geometric forms), Psychometrics, Reaction (Psychology), Reflexes, Time, Analysis of variance, Canada.

Observers judged the slant and shape of a circle, a rectangle, and a triangle, homogeneous white forms, monocularly under reduced viewing at 0, 20, 40, and 60 degrees geometric slant. Response conditions for the four groups of 24 Os each were, respectively, no delay, and two, four, and eight seconds' delay. Delay produced a significant over-all decrement in apparent slant which, for both no delay and delay, was significantly less than geometric slant and significantly greater than 0 degrees. Delay had no significant over-all effect on apparent shape which, for both no delay and delay, was similar to projective shape. The most prominent specific effect of delay on apparent shape was for the rectangle, which became significantly more like projective shape. The relation between apparent slant and shape failed to accord with the invariance hypothesis. The effect of delay was at variance with the view that drawn shape is confounded by implicitly judged slant. (Author)

AD-612 564 Div. 28

Oxford Univ. (England).
SHAPE DISCRIMINATION BY RATS: SQUARES AND RECTANGLES,
by N. S. Sutherland and A. E. Carr. 1964, 10p
Contract N62558 2453
Unclassified report

Pub. in British Journal of Psychology v55 n1 p39-48 1964 (Copies available only to DDC users).

Descriptors: (*Visual acuity, Rats), (*Geometric forms, Visual perception), (*Transfer of training, Psychometrics), Learning, Training, Performance tests, Vision, Cephalopoda, Great Britain.

Sixteen rats were trained to discriminate between a square and a rectangle: both shapes were presented in different orientations to different animals. All animals were trained in succession with positive shape only, positive and negative shapes presented simultaneously, positive and negative shapes presented successively;

finally they were given tests with 18 transfer shapes presented singly. Although the rats showed a strong preference for the square early in training, they later responded more accurately to the rectangle presented on its own than to the square. There was no tendency to transfer from a rectangle in one orientation to rectangles in other orientations, and indeed when a horizontal rectangle was substituted for a vertical or vice versa negative transfer resulted. The rats (unlike octopuses) showed complete transfer to outline shapes. The transfer test results are discussed in relation to recent physiological discoveries about retinal receptive fields. (Author)

AD-612 649 Div. 28
CFSTI Prices: HC$2.00 MF$0.50

Institute for Behavioral Research, Univ. of Maryland, College Park.
CROSS-CULTURAL INVESTIGATION OF SOME FACTORS IN PERSUASION AND ATTITUDE CHANGE. WRITTEN VERSUS ORAL PRESENTATION OF A COMMUNICATION,
by Elliott McGinnies. Jan 65, 26p
Technical rept. no. TR-6
Contract Nonr372001, Proj. NR171 250
Unclassified report

Descriptors: (*Social communication, Analysis), (*Attitudes, Psychometrics), (*Public opinion, Students), Japan, Perception (Psychology), Auditory perception, Visual perception, Reading, Speech, Effectiveness, Magnetic recording systems, Personnel, Culture, Decision making, Political science, United States, Cuba.

In order to determine the relative effectiveness of written and vocal communications, 42 Japanese university students were presented with a tape-recorded communication representing the position of the United States at the time of the Cuban crisis. An additional 26 students from a different class read the same communication from a printed form. The attitudes of the students on this issue, defined as pro-United States or pro-Soviet, were determined one week prior to the experimental treatments and again immediately after exposure to the communications, whether written or oral. The subjects also rated the convincingness of the communication under each condition and indicated their perceptions of the communicator, using an adjective checklist. The results showed that those students who read the communication moved to a significant extent in a more pro-United States direction on the attitude scale. Those students who listened to the communication, on the other hand, showed no shift in attitude from their original position. The reading subjects also judged the communication as significantly more convincing and perceived the communicator more favorably than did the listening subjects. (Author)

AD-612 726 Div. 28, 1
CFSTI Prices: HC$1.00 MF$0.50

Bunker-Ramo Corp., Canoga Park, Calif.
HUMAN ENGINEERING: PILOT FACTORS PROGRAM. Final summary rept. for 1 Oct 64-31 Jan 65,
by A. C. McTee and W. F. Swartz. Feb 65, 18p
Contract AF33 615 2214
Unclassified report

Research a continuation of Contract AF33 616 7752. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy available for public sale.

Descriptors: (*Landings, All-weather aviation), (*All-weather aviation, Research program administration), (*Human engineering, Flight control systems), (*Instrument flight, All-weather aviation), Pilots, Aircraft equipment, Roll, Pitch (Motion), Oscillographs, Data processing systems.

The work reported in this study represents a portion of the continuing effort to define the pilot factors essential to successful all-weather landing. The program is here described in three general activity areas, which are called respectively the T-39, T-29, and Consulting areas. These areas are characterized by a common plan of approach: technical direction and furnishing of project equipment by the Lear-Siegler engineering support group, development of instrument flying procedures and inflight conduct of studies by the Instrument Evaluation Section, and development of measurement techniques, data collection, reduction, and analysis by the GBunker-Ramo support group. This report makes no effort at the distinction of the efforts of the individual elements, except that it is perhaps more conversant with the activities of the human engineering support group.

AD-612 741 Div. 28

Defence Research Medical Labs., Toronto (Ontario).
AUDITORY SHORT-TERM MEMORY,
by Jane F. Mackworth. 21 May 64, 13p
Research Paper no. RP-540
Proj. D77 94 20 46
Unclassified report

Pub. in Canadian Journal of Psychology v18 n4 p292-303 1964 (Copies available only to DDC users).

Descriptors: (*Memory, Psychometrics), (*Recall, Auditory signals), Numbers, Colors, Geometric forms, Verbal behavior, Interference, Analysis of variance, Canada.

Immediate recall of sets of digits, letters, and colour or shape names presented aurally resembled recall of visual material in the effects of material and message length, but more items were recalled when the messages were presented faster, in contrast to visual presentation. Vocal rehearsal during presentation reduced recall. Ten Ss were tested for each comparison. (Author)

AD-612 742 Div. 28

Defence Research Medical Labs., Toronto (Ontario).
RELATION OF SLANT AND SHAPE JUDGMENTS IN REDUCED VIEWING,
by A. H. Smith. 30 Sep 63, 12p
Research paper no. RP-504
Proj. D77 94 20 46
Unclassified report

Pub. in Canadian Journal of Psychology v18 n3 p224-34 1964. Copies available only to DDC users.

Descriptors: (*Visual perception, Geometric forms), Vision, Perception (Psychology), Psychophysiology, Reaction (Psychology), Errors.

Observers estimated the slant and drew the apparent shape of a homogeneous white circle and a similar rectangle under monocular and binocular reduction conditions for zero and four degrees of geometric slant. In terms of the requirement that, when slant is underestimated relative to geometric slant, but is significantly greater than zero, shape estimates should approach, but not coincide with, the projective shape, the results failed to support the invariance hypothesis. The findings are discussed in relation to the view that the hypothesis should be tested without reference to the projective geometry of the stimuli. (Author)

AD-612 743 Div. 28

Defence Research Medical Labs., Toronto (Ontario).
PERFORMANCE DECREMENT IN VIGILANCE, THRESHOLD, AND HIGH-SPEED PERCEPTUAL MOTOR TASKS,
by Jane F. Macworth. 12 Dec 63, 15p
Research paper no. RP-533
Proj. D77 94 20 42

Unclassified report

Pub. in Canadian Journal of Psychology v18 n3 p209-23 1964
Copies available only to DDC users.

Descriptors: (*Attention, Performance (Human)), Thresholds (Physiology), Perception (Psychology), Psychomotor tests, Visual signals, Decision making, Reaction (Psychology), Reflexes, Learning, Motor reactions, Inhibition, Drugs, Amphetamines, Canada.

The decrement in performance found in vigilance, threshold determinations, and high-speed perceptual motor tasks appears to be a linear function of the square root of time on task; it is suggested that the common factor is a requirement for continuous attention. The decrement can be prevented in both active and passive tasks by rest pauses, knowledge of results, and amphetamine. (Author)

AD-612 748 Div. 28

Oxford Univ. (England).
PERFORMANCE OF OCTOPUS OVER A SERIES OF REVERSALS OF A SIMULTANEOUS DISCRIMINATION,
by N. J. Mackintosh and J. Mackintosh. 12 Jun 63, 4p
Contract N62558 2453

Unclassified report

Pub. in Animal Behavior (Gt. Brit.) v12 n2/3 p321-4 Apr-Jul 1964 (Copies available only to DDC users).

Descriptors: (*Cephalopoda, Learning), (*Learning, Cephalopoda), Behavior, Conditioned reflex, Analysis of variance.

Octopuses, unlike other invertebrates tested are capable of definite improvement over a series of discrimination reversals; one animal showed one trial reversal. One cause of improvement over a series of reversals is that during later reversals animals are able to ignore irrelevant cues, by which in early reversals they are hindered. A similar result has been found in rats by Lawrence and Mason (1955). Adaptation of responses to irrelevant cues might come about in either of two ways. Animals might either learn through experience of a particular irrelevant cue that it is irrelevant, or they might learn that a particular cue is relevant, and thus come to pay attention to this cue and ignore others. The first alternative is suggested by Harlow (1959) in his theory of Error Factor elimination; the second by Sutherland's model of discrimination learning (Sutherland, 1959). In the present experiment, all animals had equal opportunity to learn that brightness was the relevant cue, but only Group HV had the opportunity to learn that orientation was irrelevant. In spite of this, the three subjects in Groups O confronted with the second irrelevant cue from R sub 9 onwards, both learned subsequent reversals as fast as Group HV, and showed no greater tendency to respond to orientation. The results are consistent with those obtained in a previous experiment with rats (Mackintosh, 1963), and support Sutherland's theory of discrimination learning. (Author)

AD-612 768 Div. 28, 16
CFSTI Prices: HC$2.00 MF$0.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
INVESTIGATIONS OF ACOUSTIC EFFECTS UPON VISUAL SIGNAL DETECTION,
by William H. Watkins and Carl E. Feehrer.
Dec 64, 30p ESD-TR-64-557
Proj. 7682, Task 768201

Unclassified report

Descriptors: (*Attention, Performance (Human)), (*Visual signals, Perception (Psychology)), (*Perception (Psychology), Noise), Hearing, Behavior, Display systems, Visual perception, Reaction (Psychology), Reflexes.

Several patterns of aural white noise of moderate intensity were presented in 4 forced-choice experiments to investigate acoustic influence upon visual detection. When noise was present, but not continuous, the temporal properties of its bursts or interruptions bore a regular relation to the observation intervals involved in the visual task. Detection rates were highest when bursts of noise coincided with observation intervals. Rates were somewhat higher when there were interruptions at observation intervals than when noise was continuous. Acoustic facilitation was reduced to a (statistically) non-significant level when the visual signal was made spatially coincident with one of four light flashes. Practice effects were present over the full span of the longest of these experiments, but not obvious in each of the experiments. (Author)

AD-612 777 Div. 28, 12, 19
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
AN EXPERIMENTAL STUDY OF MANUAL CONTROL DURING TERMINAL RENDEZVOUS UNDER ADVERSE CONDITIONS,
by D. W. Eliason. 1 Feb 65, 34p Rept. no. 6-65-65-1

Unclassified report

Descriptors: (*Performance (Human), Space navigation), (*Terminal guidance, Rendezvous guidance), (*Rendezvous guidance, Thrust), Experimental data, Astronauts, Flight simulators, Attitude control systems, Fuel consumption.

Human performance was measured in an orbital rendezvous task under adverse conditions; e.g., thrust misalignments. An experiment was carried out using four subjects, a control-display cockpit simulator, and a six degree of freedom analog computer mechanization. Two thrust configurations (single vs multiple engine) were studied and compared using performance criteria of fuel consumption and final errors in relative velocity and vehicle orientation. The single-axis attitude-thrust (single engine) configuration was superior with respect to fuel consumption. The three-axis orthogonal-thrust (multiple engine) configuration exhibited higher reliability and smaller final errors in relative velocity and orientation. (Author)

AD-612 827 Div. 28

Rutgers - The State Univ., New Brunswick, N. J.
HOMEOSTASIS IN GROUPS,
by F. K. Berrien. 1960, 13p
Contract Nonr40410

Unclassified report

Pub. in General Systems. Yearbook (U. S.) v9 p205-17 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Group dynamics, Social psychology), Motivation, Behavior, Personality, Leadership, Decision making, Theory.

A group is described as homeostatic when it maintains a near-constancy or a gradual rise in Formal Achievement and Group Need Satisfactions. The controls of these two criteria reside both in the external and internal conditions, and are reciprocal in nature. It is hypothesized that if groups meet the definition of homeostasis, adaptability (independently measured) will be related to Formal Achievement and Group Need Satisfactions, but the latter criteria will be unrelated to each other. A second hypothesis is that the greater the adaptability of the group the less decrement it will suffer in F.A. or G.N.S. by disturbances of a given magnitude. A distinction is drawn between equilibrium and homeostasis. The former refers to the stability of the group in the face of disturbances that may force either or both criteria beyond their limits. Homeostasis refers to the pattern of interdependent responses that tend to raise the criteria to limits controlled by negative forces.

AD-612 851 Div. 28

Defence Research Medical Labs., Torento (Ontario).
RETENTION OF A SKILL AS A FUNCTION OF DISPLAY/HAND MOVEMENT RATIO DURING TRAINING,
by J. J. Lavery. 21 Aug 64, 1p DRML-TN-556
Proj. D77 94 01 16
Unclassified report

Pub. in Perceptual and Motor Skills (U. S.) v19 p626 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Motor reactions, Retention), (*Retention, Motor reactions), (*Psychomotor tests, Performance (Human)), Training, Feedback, Perception (Psychology), Learning, Display systems, Canada.

This experiment attempted to determine the effect on retention of varying the amount of information contained in knowledge of results (KR) and the cues inherent in a task. The literature suggests that precision of KR affects acquisition but not retention (McGuigan, 1959). Previous attempts to measure the effect of KR precision did not, however, vary the degree of information contained in the task itself. There is evidence that, with sufficient information in the task, retention is better when the KR precision is increased (Lavery, 1964). Thirty-six housewives from 21 to 35 yr. of age were Ss; 12 were trained under each gain condition for 120 trials (with KR) and then given 80 retention trials (without KR) on the first day and 120 additional retention trials 1 wk. later. The results showed no difference between groups on the first 80 retention trials on Day 1. The 2:1- and 1:1-ratio groups were clearly superior, however, to the 0.5:1-ratio group on the second retention series ($F = 7.06$ and 4.45, respectively; $df = 1/22$). Retention can be influenced by precision of KR if the degree of information in the task is great enough. Work is now under way to find out how this relationship depends upon inherent task information. The possibility of using this task to study retroactive inhibition is also being investigated.

AD-612 862 Div. 28

Maryland Univ., College Park.
THE VERBAL-LOOP HYPOTHESIS: CONVENTIONAL FIGURES,
by Murray Glanzer and William H. Clark.
14 May 63, 6p
Contract DA49 007MD1004
Unclassified report

Pub. in American Journal of Psychology (U. S.) v77 n4 p621-6 Dec 1964 (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with New York Univ., N. Y. and Walter Reed Army Inst. of Research, Washington, D. C.

Descriptors: (*Perception (Psychology), Verbal behavior), (*Verbal behavior, Perception (Psychology)), Psychometrics, Geometric forms, Recall, Correlation techniques.

The verbal-loop hypothesis states that perceptual processing includes covert verbalization and that the length of verbalization determines the 'complexity' of the stimulus-object. Using overt descriptions to estimate the covert length of verbalization, it was possible to account for two measures of the complexity of conventional outline figures. One measure was a behavioral one--the accuracy of reproduction after brief exposure. The other measure was based on ratings of complexity. The data support the hypothesis as an alternative to Gestalt- and information-theory approaches to perceptual organization. (Author)

AD-612 863 Div. 28, 16

Indiana Univ., Bloomington.
INTRODUCTION TO MOLECULAR PSYCHOLOGY,
by Walter J. Moore and Henry R. Mahler. 1964, 13p
Unclassified report

Pub. in Journal of Chemical Education (U. S.) v42 n1 p49-60 Jan 1965 (Copies not available to DDC or Clearinghouse customers).
Rept. a part of the Proceeding of the Spring Meeting of the California Association of Chemistry Teachers, 1964.

Descriptors: (*Psychology, Biochemistry), (*Memory, Biochemistry), Brain, Mental disorders, Psychotropic agents, Cerebral cortex, Nerve cells, Nerve impulses, History, Proteins, Amino acids, Synthesis, Animals, Regeneration, Learning, Emotions, Ribonucleic acids, Conditioned reflex, Desoxyribonucleic acids, Electrolytes (Physiology), Computers.

Contents:
Chemotherapeutic agents used in mental disorders
Histology of neurons
Computers and brains
Memory and emotion
Structure of synapses
RNA and memory
Biological memory models.

AD-612 891 Div. 28, 7, 8
CFSTI Prices: HC$3.00 MF$0.75

Air Force Logistics Command, Wright-Patterson AFB, Ohio.
DEVELOPMENT OF AN ELECTRICAL/ELECTRONIC TEST BATTERY,
by Harry D. Wilfong and Donald R. Wagner.
28 Oct 64, 55p Research rept. PRP-EM-62-1
Unclassified report

Descriptors: (*Achievement tests, Electronic technician), (*Test construction, Achievement tests), (*Electrical equipment, Achievement tests), Performance test, Job analysis, Industrial psychology, Air Force, Civilian personnel.

The report describes the operation and results of an experimental test development approach in the electrical/electronics occupational area. Concurrent with construction of an Electrical-Electronic Test Battery, the use of a 'Job Element' as a unit for test development puropses was examined. The results of administering the battery to a sample of Air Force civilian employees in the electronics and related job series demonstrated effectiveness of the job element sub-tests in discriminating between various electronic specialities. The final battery is recommended throughout the Air Force as a selection instrument. The job element approach to job knowledge test construction is endorsed as the most practical means of constructing future Air Force tests in the Wage Board area. (Author)

AD-612 936 Div. 28
CFSTI Prices: HC$2.00 MF$0.50

Group Effectiveness Research Lab., Univ. of Illinois, Urbana.
SOME DETERMINANTS OF AN INDIVIDUAL'S ESTEEM FOR HIS LEAST PREFERRED CO-WORKER: AN ATTITUDINAL ANALYSIS,
by Martin Fishbein, Eva Landy, and Grace Hatch.
Feb 65, 38p Technical rept. nos. ONR-TR-21, USPH-TR-20
Contract Nonr183436; Grant PHS M1774, Proj. NR177 472
Unclassified report

Descriptors: (*Group dynamics, Attitudes), (*Attitudes, Group dynamics), Personality, Leadership, Effectiveness, Behavior, Intelligence tests, Correlation techniques, Analysis of variance, Psychometrics.

This paper reports a study designed to test the assumption that the LPC score can best be considered as an attitude score. One hundred seventy-nine male Ss listed what they believed to be the characteristics of their 'least preferred co-worker,' indicated how strongly they held these beliefs, and evaluated each of the characteristics. In addition each S rated his 'least preferred co-worker' on Fiedler's Standard Esteem Scale, and responded to several personality questionnaires. Through a consideration of each Ss beliefs about his 'least preferred co-worker,' estimated LPC scores were computed, and these estimated scores were correlated with the obtained LPC scores. The results provide strong support for the conceptualization of the LPC score as an attitude score. Further, a consideration of the 'types' of beliefs elicited by high and low LPC Ss suggested that these individuals have markedly different types of least preferred co-workers. Some of the implications of this latter finding are discussed. (Author)

AD-612 952 Div. 28
CFSTI Prices: HC$1.00 MF$0.50

Bucknell Univ., Lewisburg, Pa.
THE CHILDHOOD DEVELOPMENT OF FEAR OF FAILURE MOTIVATION,
by Paul E. McGhee and Richard C. Teevan.
1965, 21p Technical rept. no. TR-15
Contract Nonr359101, Proj. NR171 803
Unclassified report

Descriptors: (*Behavior, Motivation), (*Motivation, Children), Fear, Adults, Psychometrics, Projective techniques.

Mothers of high and low fear of failure (FF) Ss completed a modified Winterbottom questionnaire. The results indicated that: (1) mothers of high FF Ss expected independence and achievement behaviors earlier than mothers of low FF Ss; (2) mothers of high FF Ss were neutral following satisfactory behavior and mothers of low FF Ss rewarding; (3) Ss whose mothers were neutral following satisfactory behavior and punishing following unsatisfactory behavior had higher FF motivation than Ss whose mothers were rewarding and neutral respectively. It was concluded that only (2) and (3) contribute to the differential development of FF and HS (hope of success) achievement motivation. (Author)

AD-612 953 Div. 28
CFSTI Prices: HC$1.00 MF$0.50

Bucknell Univ., Lewisburg, Pa.
THE EFFECT OF VALUE OF SUCCESS UPON THE EXPECTATION OF SUCCESS,
by Harvey Burdick. 1965, 23p
Technical rept. no. TR-14
Contract Nonr359101, Proj. NR171 803
Unclassified report

Descriptors: (*Motivation, Psychometrics), (*Attitudes, Social psychology), Behavior, Projective techniques, Performance (Human), Probability.

A series of 5 studies have been designed to determine the effect of desire upon the expectation of success. Two of the 5 studies have been conducted and the data analyzed. The results of the two studies show that desire has a positive distorting effect upon expectations of success but also that as desire increases the degree of distortion decreases. Two of the remaining three studies have been designed to complete the negative curve by showing that with further increases in desire (importance of success on the task) there will be a negative distortion of success expectation. The remaining study will move importance of success to a critical point with the purpose of demonstrating that the negative relationship between desire and expectation changes into a positive relationship. With the completion of the five studies it is our hope that we will have resolved the conflict between two current theories, one claiming a negative relationship and the other a positive relationship between desire and expectation of success. (Author)

AD-613 041 Div. 28, 16

Harvard Univ., Boston Mass. Medical School.
THE INFLUENCE OF DIFFERENT TASK ROLES ON AUTONOMIC AND SUBJECTIVE RESPONSE,
by David Shapiro and P. Herbert Leiderman.
Feb 65, 19p Technical rept. no. TR-12
Contract Nonr186643; Grant PHS MH-08853-01, Proj. NR170 518
Unclassified report

Prepared in cooperation with Stanford Univ., Calif. School of Medicine.
Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Group dynamics, Adaptation (Physiology)), (*Autonomic nervous system, Psychophysiology), (*Psychophysiology, Group dynamics), Behavior, Perception (Psychology), Reaction (Psychology), Galvanic skin response, Pulse rate, Heart, Anxiety, Performance tests, Analysis of variance.

This is a study of the autonomic correlates of task roles under controlled behavioral conditions. Significant differences in skin potential adaptation were found which do not depend on differences in overt physical activity. The autonomic changes were related to success and failure and to role pairing. The mediation of these changes by subjects' perceptions of their role is described. (Author)

Division 28 - PSYCHOLOGY AND HUMAN ENGINEERING

AD-613 045 Div. 28
CFSTI Prices: HC$3.00 MF$0.75

Missouri Univ., Columbia.
COMPARISON OF OBSERVED AND RECALL BEHAVIOR,
by Richard C. Ingraham and Richard Videbeck.
Feb 65, 67p Technical rept. no. TR-15
Contract Nonr229602
Unclassified report

Prepared in cooperation with Syracuse Univ., N. Y.

Descriptors: (*Psychometrics, Reliability), (*Recall, Behavior), (*Behavior, Recall), Children, Adults, Group dynamics, Verbal behavior, Social psychology, Errors.

Data on observed mealtime behavior and recall of that behavior were compared and analyzed to determine the veridicality of retrospective data. Families ate two meals while under observation using video tape recording equipment. Half of the families were interviewed three weeks later and the other half six weeks after the meals. Using extensive interviewing procedures the parents were asked to report all that they could remember about the two meals and specifically what they could remember about their children's behavior. Comparison of data indicated that only 43% of the original behavior was recalled and the total recollections 22% had not even occurred at the meals. This suggests that research based on retrospective data should be carefully examined and that findings of such studies should be applied with hesitancy. The data also disclosed that there is a linear relationship between the amount of behavior that occurred and the amount subsequently recalled by any given person. (Author)

AD-613 058 Div. 28
CFSTI Prices: HC$3.00 MF$0.75

Berkeley Inst. of Psychological Research, San Francisco, Calif.
CORRELATES OF FIELD BEHAVIOR. BEHAVIORAL RESEARCH DURING THE 1963 AMERICAN MOUNT EVEREST EXPEDITION,
by James T. Lester, Jr. Mar 65, 77p
Technical rept. no. TR-1
Contract Nonr467200, Proj. NR171 257
Unclassified report

See also AD-420 885, AD-607 336.

Descriptors: (*Behavior, Stress (Physiology)), (*Group dynamics, Behavior), (*Personality, Psychometrics), Leadership, Sociometrics, Social psychology, Stress (Psychology), Performance (Human).

The report summarizes one aspect of the behavioral research done on the 1963 American Mt. Everest Expedition, viz., the correlation between certain criterion variables (field behavior) and pre-expedition personality assessment results. Section II explores the nature of the criterion variables; section III presents and discusses the assessment correlates. It appears that the responses of subjects on assessment techniques were valid samples of certain kinds of behavior which were later to be seen in the field, and which carried weight in the sociometric nominations used as criteria. The personological implications from all sources of data reported on show a high degree of congruence, which is encouraging with regard to the goal of developing techniques for predicting interpersonal performance in extreme environments. (Author)

AD-613 075 Div. 28, 15
CFSTI Prices: HC$4.00 MF$0.75

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
ANALYSIS OF MARKOV CHAIN MODELS OF ADAPTIVE PROCESSES.
Final rept. for May 63-Mar 64,
by K. R. Kaplan and J. Sklansky. Jan 65, 111p
Contract AF33 657 11336, Proj. 7233, Task 723305
AMRL TR-65-3
Unclassified report

See also AD-602 966.

Descriptors: (*Stochastic processes, Biophysics), (*Biophysics, Stochastic processes), Feedback, Bionics, Learning, Adjustment (Psychology), Adaptation (Physiology), Thresholds (Physiology), Cybernetics, Probability.

Learning and adaptation are considered to be stochastic in nature by most modern psychologists and by many engineers. Markov chains are among the simplest and best understood models of stochastic processes and, in recent years, have frequently found application as models of adaptive processes. A number of new techniques are developed for the analysis of synchronous and asynchronous Markov chains, with emphasis on the problems encountered in the use of these chains as models of adaptive processes. Signal flow analysis yields simplified computations of asymptotic success probabilities, delay times, and other indices of performance. The techniques are illustrated by several examples of adaptive processes. These examples yield further insight into the relations between adaptation and feedback. (Author)

AD-613 115 Div. 28

Michigan Univ., Ann Arbor.
THE REQUIREMENTS AND DESIGN OF A STANDARD GROUP TASK,
by Robert B. Zajonc. 1963, 19p
Contract Nonr122434, Proj. NR170 309
Unclassified report

Pub. in Journal of Experimental Social Psychology (U. S.) v1 n1 p71-88 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Group dynamics, Psychometrics), (*Psychometrics, Group dynamics), Behavior, Measurement, Standardization.

The purpose of this paper is to underscore the need for standard procedures in group psychology, to examine the requirements which a standard group task should meet, and to describe a solution in this respect.

29. Quartermaster Equipment and Supplies

No Entries

30. Research and Research Equipment

AD-612 452 Div. 30

Air Force Avionics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
BAKEABLE UHV VALVES WITH LONG LIFE. Revised ed.,
by G. Medicus and W. Jehn. 19 Sep 62, 5p
Rept. no. AL-TR-64-297
Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v33 n11 p1265-7 Nov 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*High-vacuum valves, Design), (*Seals (Stoppers), High-vacuum valves), Vacuum apparatus, Platinum, Gaskets, Deformation, Drives, Performance (Engineering).

Bakeable uhv valves with leak rates below about 5x10 to 6th power molecules/sec equals approx. 1.5x10 to - 16th power liters/sec, and one hundred or more baking and closing cycles are described. The long life and the low leak rates are achieved by plastic deformation and low-loss confinement of a thin Pt gasket diffused onto a narrow spherical zone of a tungsten carbide seat ring, with a tungsten carbide hemisphere serving as a stopper. (Author)

AD-612 489 Div. 30, 14, 25
CFSTI Prices: HC$1.00 MF$0.50

Polymer Research Inst., Univ. of Massachusetts, Amherst.
A TECHNIQUE FOR THE STUDY OF SPHERULITE DEFORMATION: LIGHT SCATTERING MOVIES,
by P. F. Erhardt and R. S. Stein. 1 Dec 64, 8p
Technical rept. no. TR-77
Contract Nonr335701, Proj. NR056 378
Unclassified report

Descriptors: (*Test methods, Polymers), (*Polymers, Crystal structure), (*Crystals, Deformation), (*Motion picture cameras, Monitors), (*Lasers, Gas discharges), Light, Scattering, Spheres, Polyethylene plastics, Relaxation time.

It has been found practical to take a nearly continuous set of light scattering photographs from a single sample by using a continuous wave (C. W.) gas laser as the source, and a high speed motion picture camera as the detector. The polarized beam from a Spectra Physics Model 130 C.W. Laser was passed through a suitable cut-off filter to eliminate the blue fluorescent light, and then through a pin hole. The sample was placed in the rapid stretching device described previously (AD-420 270). A polaroid sheet analyzer was placed between the sample and the photographic film. Generally, no lens was used in the Fastax WF-17 (or other) movie cameras employed. With a Fastax WF-17 Camera and a Spectra Physics Model 115 Gas Laser as source, good scattering patterns were obtained at camera speeds as high as 5400 frames per second, using Kodak Tri-X Negative film. There was change in H(V) scattering patterns on stretching medium density polyethylene, using a camera of intermediate speed.

AD-612 491 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
PRESSURE TRANSDUCER FOR MEASURING SHOCK WAVE PROFILES. PHASE X: MEASUREMENT OF LOW-PRESSURE SHOCK WAVE PROFILES.
Progress rept. nos. 42 and 11, 1-28 Feb 65,
by D. D. Keough. 8 Mar 65, 5p
Contracts DA49 146XZ096, DA49 146XZ280, Projs. GSU3713, GSU4832
Unclassified report

See also AD-609 265.

Descriptors: (*Transducers, Pressure gages), (*Shock waves, Measurement), Test equipment, Calcium, Granite, Glass, Lead, Equations of state, Life expectancy, Design.

Summaries are given of tests on the radial tolerance of granite gages and the shelf life of calcium transducers. Equations-of-state data were obtained for Hi-D glass.

AD-612 493 Div. 30, 26
CFSTI Prices: HC$1.00 MF$0.50

Army Missile Command, Redstone Arsenal, Ala.
EFFECT ON THERMOCOUPLE SIZE AND INSTALLATION ON TEMPERATURE READINGS,
by Noah J. Hurst. 8 Apr 64, 21p
Rept. no. RS-TM-64-1
Proj. 1A013001A039
Unclassified report

Descriptors: (*Thermocouples, Performance (Engineering)), Temperature, Measurement, Test methods, Colorimeters, Wire, Statistical analysis, Analysis of variance.

When thermocouples are used in precise testing and experimental work, it is very important that the indication of the thermocouple junction accurately represent the temperature being investigated. When the entire hot junction of a thermocouple is maintained at a steady temperature and there is good physical contact between the thermocouple junction and the surrounding material, its indications are, of course, trustworthy provided no appreciable conduction occurs along the lead wires, and provided radiant interchanges may be neglected. However, if a large temperature gradient exists around the hot junction, or if the temperature of the junction is varying with time, the indication that is read may be questionable. The experiment described in this report was conducted to determine the effect of thermocouple size and installation on temperature reading. It was concluded that for these heat fluxes (30 and 60 BTU/sq ft-sec), wire sizes (No. 24 and 30) and method of installation (bead or separate) there was no significant difference in the observed temperature readings. (Author)

AD-612 500 Div. 30, 25
CFSTI Prices: HC$1.00 MF$0.50

Institute of Optics, Univ. of Rochester, N. Y.
A SERIES OF LENSES DESIGNED ON LARGE COMPUTERS,
by R. E. Hopkins. 1964, 6p
Grant AF AFOSR50 63
AFOSR 65-0444
Unclassified report

Also includes International Commission for Optics, Conference on Photographic and Spectroscopic Optics, 1-8 Sep 64, held at Tokyo and Kyoto.

Descriptors: (*Lenses, Design), Performance (Engineering), Specifications, Glass, Images, Tables, Colors, Computers.

Four lenses were designed to meet the following specifications: focal length 24.00 inches, f-number 6.0, full field format 9 inches square, color correction 4800A to 6500A. These designs provide information on what one may expect for performance from lenses of this type. The lenses were designed using a powerful automatic correcting program. Even though these lenses were designed for a specific task the data can be used to predict performance for a range of other problems.

AD-612 505 Div. 30, 14
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
A NEW SENSING TECHNIQUE APPLIED TO AUTOMATIC POSITION CONTROL IN CERTAIN ABLATION EXPERIMENTS,
by W. J. McLean. 4 Dec 64, 37p
Rept. no. NOLTR-64-202
Task RMMP23 054 212 1F009 06 003
Unclassified report

Descriptors: (*Ablation, Test methods), Pyrolysis, Rods, Positioning devices (Machinery), Servomechanisms, Probes (Electromagnetic), Test equipment, Plasma medium, Heat transfer, Plasma medium, Ionic current, Automatic, Control.

A new sensing technique was devised that can be applied to automatic adjustment of the position of the ablating end of an NOL alpha-rod specimen of organic material which is being consumed endwise in a hot, corrosive atmosphere. The sensor is an ion collector which is located close to the edge of the ablating end of the rod and which is just barely immersed in some of the hot, weakly ionized gases near this end. The ion density in the vicinity of the collector depends strongly on how closely the ablating end of the rod approaches it. Ions neutralized on the collector give rise to a small current that can be used as a signal for control purposes, such as keeping the ablating region in a relatively fixed position in space so that the rod can be moved into the hot, corrosive atmosphere at a rate which just counterbalances the rate of pyrolysis of the material of the rod. Read-out of position of the cold end of the rod with time gives a measure of the ablation rate. (Author)

AD-612 507 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Test Station, China Lake, Calif.
SELECTED OFFICIAL PUBLICATIONS, PROFESSIONAL PAPERS, AND PATENTS. 1963 EDITION.
Nov 64, 64p Rept. no. NOTS-TP-3413
Unclassified report

See also AD-288 799.

Descriptors: (*Military publications, Naval research), (*Reports, Naval research), (*Patents, Naval research), (*Naval research, Scientific research), Bibliographies, Abstracting, Indexes.

AD-612 535 Div. 30, 8, 15, 16
CFSTI Prices: HC$1.00 MF$0.50

Electronics Research Lab., Montana State Coll., Bozeman.
INVESTIGATION OF THE APPLICATION OF ITERATIVE NET THEORY TO CENTRAL NERVOUS SYSTEMS.
Final rept. for Nov 63-Oct 64,
by William L. Kilmer. Oct 64, 11p
Rept. no. ERL-8-0009-622
Contract AF19 628 3807, Proj. 5632, Task 563202
AFCRL 64-972
Unclassified report

Descriptors: (*Central nervous system, Mathematical models), (*Bionics, Iterative methods), (*Automata, Probability), Brain, Computers, Simulation.

Work concerning probabilistic automata and computer simulation of a reticular formation model is briefly summarized.

AD-612 541 Div. 30, 8, 28
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 2. DATA SYSTEMS.
Quarterly progress rept. for 1 Nov 64-31 Jan 65,
by F. C. Frick. 15 Feb 65, 25p
Contract AF19 628 500
ESD TDR-65-47
Unclassified report

See also AD-609 005.

Descriptors: (*Computers, Scientific research), (*Magnetic tape, Scientific research), (*Psychology, Scientific research), (*Data processing systems, Computers), Data processing systems, Computer storage devices, Analog-digital computers, Diodes, Aluminum compounds, Oxides, Control, Transistors, Recall, Perception (Psychology), Control systems.

Contents:
Digital computers---Group 23
Computer systems
Circuit development
Magnetic film engineering
System programming and applications
Computer components---Group 24
Magnetic films
Electron transport
Psychology---Group 25
Automatic procedure executor
Human information processes
Control research---Group 28
Hybrid computer systems
Estimation and control studies.

AD-612 558 Div. 30, 25

Defence Research Telecommunications Establishment, Ottawa (Ontario).
AN A. C. HALL EFFECT GAUSSMETER,
by C. D. Cox. 7 Jul 64, 2p
Unclassified report

Pub. in Journal of Scientific Instruments (Gt. Brit.) v41 p690-1 Nov 1964 (Copies available only to DDC users).

Descriptors: (*Hall effect, Measuring devices (Electrical and Electronic)), (*Measuring devices (Electrical and Electronic), Hall effect), Magnetometers, Magnetism, Measurement, Generators, Circuits, Alternating current, Germanium, Diodes (Semiconductor), Galvanometers, Voltage, Direct current, Magnetic fields.

This note describes an a.c. comparator circuit which uses a Hall generator for measurement of d.c. magnetic fields. The accuracy is to 1% between 180 and 12000 gauss. (Author)

AD-612 574 Div. 30, 2, 25

Harvard Coll., Cambridge, Mass. Observatory.
TEMPERATURE MEASUREMENTS FOR POWDERED SOLIDS IN REFLECTED SHOCK WAVES.
Revised ed.,
by W. H. Parkinson and E. M. Reeves. 30 Apr 64, 14p
Contract Nonr186648; Grant NsG438
Unclassified report

Pub. in Royal Society of London. Proceedings. Series A. Mathematical and Physical Sciences (Gt. Brit.) v282 p265-74 1964 (Copies available only to DDC users). Revision of rept. dated 18 Feb 64.

Descriptors: (*Test methods, Temperature), (*Shock tubes, Spectroscopy), (*Shock waves, Temperature), (*Powders, Shock tubes), Measurement, Gases, Argon, Calcium compounds, Aluminum compounds, Sulfides, Atomic energy levels, Excitation, Vaporization, Emissivity, Astrophysics.

Measurements have been made to determine the temperature behind reflected shock waves from an aerodynamic shock in argon containing a sample of powdered material. Time-resolved temperatures were measured photoelectrically by the brightness-emissivity method which employs a short duration flash tube. The measured temperatures were consistent, and about 10% lower than the calculated temperature for pure argon, over a 9 eV range of atomic excitation energies, indicating that thermodynamic equilibrium has been achieved. Calculated and measured densities for the atoms of the powder indicate that approximately 40% of the sample was uniformly distributed behind the reflected shock wave. (Author)

AD-612 590 Div. 30

Detroit Univ., Mich.
ELECTRONIC DAMPING FOR THE MAGNETICALLY SUSPENDED ROTOR,
by J. D. Nixon and D. J. Kenny. 12 Aug 64, 2p
Grant DA AROD31 124G203
AROD 3523:6
Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v35 n12 p1721 2 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Instrumentation, Scientific research), (*Damping, Magnetic fields), (*Magnetic fields, Suspension devices), (*Control systems, Damping), Chemistry, Solenoids, Phase shifters, Design, Steel, Ferromagnetic materials, Ball bearings.

A device for damping horizonal oscillations of a magnetically suspended rotor are discussed. A phase shifter network is used to produce a phase lead in the magnetic field to dampen the rotor.

AD-612 611 Div. 30
CFSTI Prices: HC$1.25 MF$0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Jan 65, 45p
PB 166 599
Unclassified report

Descriptors: (*Naval research, Reports), (*Scientific research, Reports), Sound, Velocity, Metals, Structural parts, Measurement, Oceans, Contamination, Nuclear powered vessels, Radiation measurement systems, Wiring Diagrams, Chemistry, Polymers, Chemical warfare agents, Decontamination, Mechanics, Shock (Mechanics), Vibration, Non-destructive testing, Metallurgy, Ceramic materials, Corrosion, Nuclear physics, Communication systems, Radio, Radar, Optics, Lasers, Solid state physics, Sound, Patents, Abstracting.

Contents Articles: A method for evaluating transducer loading effects on ultrasonic transit time measurements-E. W. Kammer; Survey for radioactive contamination in the vicinity of the USS Thresher-C. F. Dohne and J. I. Hoover. Scientific program-progress reports in the following areas: Applications research, Chemistry, Mechanics, Metallurgy and Ceramics, Nuclear and Atomic Physics, Optics, Radio, Solid-State Physics, Sound.

AD-612 614 Div. 30, 15, 23, 28, 32
CFSTI Prices: HC$5.00 MF$1.00

System Development Corp., Santa Monica, Calif.
RESEARCH AND TECHNOLOGY DIVISION REPORT FOR 1964.
Jan 65, 157p Rept. no. TM-530/008/00
Unclassified report

Descriptors: (*Information retrieval, Scientific research), (*Programming (Computers), Scientific research), (*Operations research, Scientific research), (*Decision making, Scientific research), (*Education, Scientific research), Compilers, Subject indexing, Abstracting, Classification, Reports, Laboratories, Programming languages, Command and Control systems, Display systems, Traffic, Monte Carlo method, Training.

Contents:
Information processing research
Programming systems
Programming technology
Language processing and retrieval
Mathematics and operations research
Analytic modeling
Command post simulation
Decision processes research
Education and training
Laboratory complex.

AD-612 616 Div. 30, 26
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div. Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHODS OF PREPARATION OF INFORMATION FOR MACHINE TOOLS WITH PROGRAMMED CONTROL (SELECTED ARTICLES),
by V. I. Skurikhin, V. G. Tyupa, and K. V. Leppik.
5 Mar 65, 40p FTD-TT-65-149
TT 65-61834
Unclassified report

Unedited rough draft trans. of mono. Metody Podgotovki Informatsii dlya Stankov s Programmnym Upravleniyam, n.p., 1963, p. 86-100, 148-161.

Descriptors: (*Machining, Programming (Computers)), (*Programming (Computers), Machining), Computers, Milling machines, Mechanical drawings, Automation, Errors, Corrections, Control.

Contents:
Readying processing programs for machines with program control using electronic computers, by V. I. Shurikhin and V. G. Tyupa
About dynamic errors and their corrections at programmed machine control, by K. V. Leppik

AD-612 619 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
ON THE RELATIONSHIP BETWEEN AUTOMATIC PROGRAMMING FUNCTIONS AND COMPUTING SYSTEMS,
by Robert M. Dunn. Dec 64, 13p
Technical rept. ECOM-2541
Proj. 1X6 40603D494,
Tasks 1X6 40603D494 03, 1X6 40603D494 00
Unclassified report

Descriptors: (*Programming (Computers), Automatic), Digital computers.

Automatic programming is defined as the process of utilizing a computer program to accept sophisticated procedural descriptions as data in order to produce machine executable sequences of instructions as answers. The translation, memory allocation and diagnostics functions of automatic programming compose an interface between the computing system and the user. The library of subroutines available through automatic programming acts as an extension of the computing system. Ability to accept a variety of programming languages, data structures and subroutines provides flexibility to the computing system. Techniques of automatic programming will change while the functional relationship to the computing system will remain the same. (Author)

AD-612 626 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Systems Research Center, Case Inst. of Tech., Cleveland, Ohio.
A THEORY OF OPTIMALLY AND SUBOPTIMALLY CONTROLLED LINEAR SYSTEMS.
Thesis,
by Thomas C. Militano. 1964, 87p SRC-68-A-65-24
Unclassified report

Descriptors: (*Control systems, Theory), (*Linear systems, Control systems), Optimization, Feedback, Costs, Functions, Dynamic programming, Calculus of variations.

The optimal open loop control policy of a linear discrete deterministic system with respect to an additive quadratic cost functional is derived. Proportional feedback control is postulated and the system is optimized with respect to the same cost functional by choice of reference variables. Necessary and sufficient conditions on the feedback matrix in order that this optimization is equivalent to the open loop optimization are presented. The conditions on the feedback matrix are assumed not to be fulfilled and sufficient conditions for the existence of an optimizing procedure are presented. This procedure is exhibited and shown to result in a non-unique best policy and a sub-optimal cost (compared to the open loop optimal control). A second type of sub-optimality, that of time selection of control variables, is investigated. (Author)

AD-612 642 Div. 30, 8
CFSTI Prices: HC$1.00 MF$0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SINGULAR LINEAR SEQUENTIAL MACHINES: SOME FURTHER GROUP PROPERTIES AND CANONICAL FORM REALIZATIONS,
by Pierre Lavallee. 12 Oct 64, 20p
Research rept. no. PIBMRI-1250-64
Contract AF49 638 1402
Unclassified report

Descriptors: (*Circuits, Sequences), (*Set theory, Circuits), Linear systems, Analysis, Switching circuits, Groups (Mathematics), Topology, Graphics, Computers, Networks, Transients.

Singular autonomous linear sequential machines are analyzed following simple group properties introduced by Gill (IEEE Transactions on Electronic Computers, Vol. EC-13: 226-231, no. 3, Jun 1964, AD-607 476). It is shown that the set of junction states for the confluence sets form a group, with as normal subgroup, the sets of states on the cycle sets. The set of states mapping into the null (0) state also forms a group called the null tree group. The cycle set group and the null tree group are realized separately and the direct sum of these two groups completely characterizes the operation of the machine. The null tree is shown to be characterized by a set of m disjoint paths: to each of these paths there corresponds a shift register having as many delay elements as there are states in that path. (Author)

AD-612 675 Div. 30, 25
CFSTI Prices: HC$2.00 MF$0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
STUDY OF METHODS OF IMPLEMENTING POYNTING VECTOR MEASUREMENTS.
Interim rept. no. 8, 1 Apr-30 Jun 64,
by Nabil Farhat, K. S. Foo, and R. M. Showers.
31 Jul 64, 39p Rept. no. 65-07
Contract NBy32219
Unclassified report

See also AD-415 157.

Descriptors: (*Electromagnetic fields, Measurement), (*Electromagnetic properties, Energy), (*Test methods, Electromagnetic properties), Feasibility studies, Phase measurement, Voltage, Electric fields, Magnetic fields, Phase meters, Oscilloscopes.

The results are reported of a number of experiments with the 'Poynting Sensor' at a frequency of 1 Mc. The purpose of these experiments was to verify the feasibility of making Poynting vector measurements in the near field at 1 Mc. The measurements included magnitude measurement of the E and H components of the field and their relative time phase. Phase measurement was performed with the aid of an oscilloscope and also through the use of a transistorized phase-meter which was expected to provide easier and better measurement accuracy. Multiplication of the magnitudes of E and H by cos gamma (where gamma is the relative angle between them) is also described. This was achieved through the use of a square law multiplier which provided a simple but effective means of measuring the Poynting vector directly. A description is presented of the new instrumentation used, measurement techniques, and the ground plane and its bearing on the measurement at 1 Mc. Photographs of the instrument assemblies used in performing these measurements are also given.

AD-612 702 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge.
CTSS TECHNICAL NOTES,
by J. H. Saltzer. 15 Mar 65, 84p MAC-TR-16
Contract Nonr410201, Proj. DSR9457

Rept. on Proj. MAC. Unclassified report

Descriptors: (*Programming (Computers), Multiple operation), (*Computers, Systems engineering), Real time, Computer storage devices, Input-output devices.

This report is a technical description of the 7094 Compatible Time Sharing System in use at Project MAC and the M.I.T. Computation Center. It is designed to acquaint a system programmer with the techniques of construction which were used in this particular time-sharing system. Separate chapters discuss the overall supervisor program flow; console message input and output; the scheduling and storage algorithms; and a thumbnail sketch is given of each of the subroutines which make up the supervisor program. This report was prepared with the aid of the compatible time-sharing system and the TYPSET and RUNOFF commands. (Author)

AD-612 704 Div. 30, 2
CFSTI Prices: HC$3.00 MF$0.75

New Hampshire Univ., Durham.
AUTOMATIC DATA RECORDING SYSTEM FOR A COSMIC RAY MONITOR,
by Barry A. Billings and John A. Lockwood. Jan 65, 59p Scientific rept. no. SR-4
Contract AF19 628 2352, Proj. 8600, Task 860003
AFCRL 65-13
Unclassified report

Descriptors: (*Cosmic rays, Monitors), (*Monitors, Cosmic rays), (*Neutron counters, Electronic recording systems), (*Electronic recording systems, Pulse counters), Data storage systems, Punched cards, Oscillators, Digital computers, Barometric pressure, Automatic.

The purpose of this study was to design and construct an electronic system to record automatically the pulse trains produced in a cosmic-ray neutron monitor, designated NM-64. The system supplies signals every five minutes to an IBM 526 card punch causing it to punch on IBM tabulating cards the number of pulses recorded in each of the three separate channels of the cosmic-ray monitor during the previous five-minute interval, the time of day, and date of the month. The barometric pressure reading from a digital barometer is also tabulated on the same IBM card. Pulse counting is accomplished by three groups of decade counters for each pulse train. Each decade counter has an associated storage circuit. This stored information is then converted from binary coded decimal to decimal form by means of a diode matrix and punched. Accurate timing is accomplished by a crystal controlled oscillator feeding cascaded frequency dividers, the output of which supplies a signal every five minutes. (Author)

AD-612 709 Div. 30, 25
CFSTI Prices: HC$1.00 MF$0.50

Navy Underwater Sound Lab., New London, Conn.
A COMPARISON OF PROPAGATION LOSS MEASUREMENTS USING EXPLOSIVE AND SINUSOIDAL ACOUSTIC SIGNALS,
by Raymond W. Hasse, Jr. 14 Dec 60, 13p
Research rept. no. USL-498
Proj. SS046002 2
Unclassified report

Presented at the Meeting of the Acoustical Society of America (60th) held at San Francisco, Calif., Oct 1964.

Descriptors: (*Underwater sound signals, Propagation), (*Test methods, Underwater sound signals), Acoustics, Measurement, Sound generators, Sources, Underwater explosions, Pulse generators, Sound transmission.

An experimental study was conducted to compare propagation measurements made by using explosives with continuous and pulsed sinusoidal signals. By using available source level values for explosive charges, a comparison is made between the various types of signals and the results are shown to be in agreement within about 3 db. (Author)

AD-612 718 Div. 30
CFSTI Prices: HC$5.00 MF$1.00

Office of Aerospace Research, Washington, D. C.
UNITED STATES AIR FORCE RESEARCH AND OTHER PROGRAMS OF THE OFFICE OF AEROSPACE RESEARCH FOR FISCAL YEARS 1965-1966.
Oct 64, 178p Rept. no. OAR-65-2
Unclassified report

Descriptors: (*Air force research, Reports), (*Scientific research, Research program administration), Combustion, Space environmental conditions, Astronomy, Astrophysics, Meteorology, Human engineering, Medical research, Chemistry, Electronics, Energy conversion, Combustion, Physics, Materials, Mathematics, Mechanics, Nuclear physics, Geophysics, Abstracting, Detection.

This publication describes briefly all research and technical-development projects contained in the FY 65-FY 66 program of the Office of Aerospace Research. Included are brief descriptions of studies being conducted for ARPA, and resumes of work being performed for NASA and DASA. Each project description includes the name of the center where the work is being conducted, the name of the project scientist, and a description of the project objective, research approach, and plans for succeeding fiscal periods. (Author)

AD-612 727 Div. 30, 1
CFSTI Prices: HC$4.00 MF$1.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
AN AIRCRAFT FATIGUE MONITORING SYSTEM.
Final engineering rept.,
by Reginald E. Hooson. 1 Feb 65, 144p
Contract NOw61 0853c
Unclassified report

Descriptors: (*Test methods, Fatigue (Mechanics)), (*Fatigue (Mechanics), Test methods), (*Airframes, Fatigue (Mechanics)), Test equipment, Metal plates, Bonding, Life expectancy, Tests, Monitors.

A report on the development of a fatigue damage indicating system, based on the use of metal monitors bonded to the airplane structure, is presented. The development of the system includes a series of laboratory tests to determine suitable monitor designs, and to evaluate various adhesive systems. Monitor installations on the full scale fatigue tests of both the Grumman A6-A (Intruder) and E2-A (Hawkeye) airplanes are also evaluated. Results of tests indicate that further development work is necessary, and various recommendations are made. (Author)

AD-612 736 Div. 30, 5, 8, 25
CFSTI Prices: HC$3.00 MF$0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
ELECTRON AND SOLID STATE PHYSICS, AUTOMATIC CONTROL, COMMUNICATIONS AND NETWORKS, AND ELECTROMAGNETIC RADIATION.
Semiannual progress rept. no. 68, 1 Jan-1 Jul 64,

by J. A. Pierce, N. Bloembergen, and R. W. P. King.
15 Dec 64, 58p
Contracts Nonr186607, Nonr186616

Unclassified report

Descriptors: (*Physics, Scientific research), (*Control, Scientific research), (*Communication theory, Scientific research), (*Electromatic waves, Scientific research), Electrons, Solid state physics. Control systems, Networks, Automatic.

AD-612 744 Div. 30

General Electric Co., Schenectady, N. Y. Advanced Technology Labs.
LOGARITHMIC PRESSURE SCALE,
by G. C. Baldwin and Lewi Tonks. 1964, 1p

Unclassified report

Pub. in Nature (Gt. Brit.) v203 n4945 p633-4
Aug 8 1964 (Copies available only to DDC users).

Descriptors: (*Pressure, Measurement), Scale.

Enumeration of three advantages of the deciBoyle system: measurement of absolute pressure where the unit step in the scale, one Boyle, is the logarithm to the base 10 of the pressure in bars. (1) The scale encompasses the range from the smallest to the greatest. (2) The scale centers around a convenient and absolute reference standard, approximately one standard atmosphere. (3) The numeric expresses in its units place the accuracy attributable to the majority of pressure designations (i.e. ± 12%) that lie outside the range of the simple barometric column or the McLeod gage.

AD-612 767 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

National Bureau of Standards, Washington, D. C.
RANGE DATA HANDLING INTEGRATION STUDIES. IN-LINE TRANSLATORS INCORPORATING BINARY/DECIMAL CONVERTERS.
Final rept.,
by Walter Urban. Nov 64, 54p Rept. no. NBS-8578
Projs. 4230486, 5932, Task 593201
ESD TDR65 195

Unclassified report

Descriptors: (*Data transmission systems, Compatibility), Data, Signals, Control.

The translator when interposed between a particular data source and receptor must be capable of accepting the data signals, converting the data and generating signals suitable for use by the data receptor. The approach taken in this study has been first to analyze the translator as an entity in the data system. Following this, the data conversion problem has been removed from its system interface in order to assure a radix converter design which is readily adaptable for use throughout the data network. This can be achieved if the data for conversion is preconditioned and standardized by an input unit of the translator prior to entry into the radix converter. After conversion, the data is organized for transmission to the data receptor by an output unit. Thus, the translator has been separated into an Input Buffer, Composition Controller, Radix Converter, and an Output Buffer. Logic designs of the converter have been developed as a part of the study; a design of the complete translator can be developed for any specific application for which a given set of values for input data and the characteristics of the data line are stipulated. (Author)

AD-612 769 Div. 30, 8, 12, 25
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DESIGN ASPECTS OF MINIMAL-POWER DIGITAL CIRCUITRY,
by W. G. Schmidt and D. E. Chace. 9 Feb 65,
33p Group rept. GR-1965-6
Contract AF19 628 500
ESD TDR-65-45

Unclassified report

Descriptors: (*Digital computers, Circuits),(*Circuits, Design), (*Microminiaturization (Electronics), Circuits), (*Spacecraft, Digital computers), Semiconductor devices, Reliability (Electronics), Transistors, Computer logic, Computer storage devices, Relaxation oscillators, Gates (Circuits), Power.

Minimal-power digital circuitry, while a necessity for spacecraft operation, has advantages which apply to both space-borne and ground-based digital data processing. Some of the low-power digital circuit design efforts are presented in which Lincoln Laboratory has been engaged for the past few years. These techniques have been employed in a number of scientific satellites and space probes; similar designs are to be used in the Lincoln Experimental Satellite (LES). The influence of new semiconductor devices upon the minimal-power concept is discussed. (Author)

AD-612 797 Div. 30, 2, 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
MEASURING THE ELECTRICAL CHARGE AND VELOCITY OF A MOVING PROJECTILE.
Interim engineering rept. no. 1, Jul 64-Jan 65,
by J. E. Nanevicz and W. C. Wadsworth. Jan 65, 31p
Contract AF33 615 1934, Proj. 5082

Unclassified report

Descriptors: (*Projectiles, Precipitation static), (*Probes (Electromagnetic), Design), (*Radiofrequency interference, Simulation), (*Precipitation static, Measurement), Electrodes, Instrumentation, Velocity, Atmospheric precipitation, Aircraft, Friction, Ice fog, Electrostatic fields.

Two different probes were developed for measuring the electrical charge and velocity of a moving charged projectile. The probes were tested using 5/32-inch-diameter steel balls fired from a rifle at roughly 4500 feet per second. The projectiles were frictionally charged to from 50 to 100 micromicrocoulomb by passing through a 0.0003-inch-thick plastic sheet. (Author)

AD-612 801 Div. 30, 18
CFSTI Prices: HC$2.00 MF$0.50

Philco Corp., Willow Grove, Pa. Communications and Electronics Div.
PROGRAMMING AND OPERATING FOR HIGH DENSITY DRUM SYSTEM.
Final rept.,
by James H. Littrell. Jan 65, 36p
Contract AF19 628 3395
ESD TDR-65-167

Unclassified report

Descriptors: (*Computer storage devices, Instruction manuals), (*Data storage systems, Instruction manuals), (*Data processing systems, Instruction manuals), (*Programming (Computers), Data storage systems), Handbooks, Computers, Eary warning systems, Command and Control systems, Air Force.

This report gives a programming description of the High Density Drum System. The High Density Drum System is a medium capacity, random access data storage facility specifically intended for use with the Philco Model 212 Central Processor. The drum system time shares the 1.5 microsecond core storage with the computer and all other input/output devices. The system is designed to allow access to any individual word, or multiple of words up to a maximum of 8,192 words per instruction. The purpose of this report is to ensure effective implementation of the High Density Drum System in the development of computer programs and to ensure efficient operations of the High Density Drum with the Philco 2000 Model 212 Computer. Included in this report is a description of operating controls and operating instructions.

AD-612 829 Div. 30, 25

Pennsylvania State Univ., University Park.
FIELD ION MICROSCOPY WITH AN EXTERNAL IMAGE INTENSIFIER.
Technical rept.,
by S. B. McLane, E. W. Muller, and O. Nishikawa.
11 Jun 64, 7p
Contract Nonr65623, Proj. NR017 443
Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v35 n10 p1297-1302 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Field emission, Image intensifiers (Electronics)), (*Image intensifiers (Electronics), Instrumentation), Physics, Image tubes, Photographic recording system, Helium group gases, Metals, Voltage, Pressure.

The exposure time of field ion micrographs at normalized pressure and voltage represents a figure of merit for comparison of various intensifier systems. External image intensification with a commercial RCA tube reduces the exposure time by a factor of more than 100,000, allowing recording of helium ion images in 1/1000 sec and standard speed motion pictures of neon ion images. Fast field evaporating metals can now be observed dynamically, and gold and copper photographs are shown as examples. The intrinsic noise of the image intensifier is not disturbing. A flicker effect is observed in the helium ion image of a stable tungsten surface at 21K in the presence of a small amount of water vapor. The fluctuations depend upon the local field strength; they disappear with increasing field, increasing temperature, or with the addition of a trace of neon to the imaging gas. The flicker effect is probably due to desorption of water molecules by the impact of imaging gas atoms. (Author)

AD-612 832 Div. 30, 25

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A PROPOSAL FOR AN ASSOCIATIVE MEMORY USING MAGNETIC FILMS,
by J. I. Raffel and T. S. Crowther. 7 Mar 64, 1p
Unclassified report

Pub. in I E E E Transactions on Electronic Computers (U. S.) vEC-13 n5 np Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Computer storage devices, Films), (*Films, Magnetic recording systems), (*Magnetic recording systems, Films), Magnetic materials, Information retrieval.

The proposed memory consists of a normal word line over a strip of magnetic film and a digit line split into three parallel conductors. Writing is accomplished using the standard method of coincidence of transverse and digit fields (all three digit conductors are excited equally). The result is a region at the intersection which is magnetized either to the right for a ONE or to the left for a ZERO. To interrogate the memory in all bits simultaneously, the middle digit conductors alone are excited with a field to the left, if searching for a ZERO, and with a field to the right, if searching for a ONE. For either match condition, there will be essentially no change in the magnetization of the interrogated cell. For a mismatch, the magnetization will rotate noncoherently to the multidomain pattern which occurs just below nucleation. It is proposed that the magnetoresistive effect be used to sense the mismatch condition. Experimentally, it is found that a resistance change corresponding to approximately 10 per cent of that for full transverse switching is obtained.

AD-612 858 Div. 30

Washington Univ., Seattle.
VIBRATING WIRE VISCOMETER.
by J. T. Tough, W. D. McCormick, and J. G. Dash.
2 Jul 64, 6p
Grant AF AFOSR62 298
AFOSR 65-0398
Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v35 n10 p1345-8 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Viscosimeters, Liquefied gases), Wire, Vibration, Damping, Helium, Cryogenics, Viscosity, Fluids.

The damping of transverse vibrations of a wire in a viscous fluid is the basis for a viscometer of high precision and versatility. A solution to the hydrodynamic problem is indicated, and shown to be valid for a wide range of physical parameters. The device is simple in operation and design, adaptable to various decay constant measuring techniques, and requires only a small volume of sample fluid. The viscosity of liquid helium II between 1.10 K and the lambda point has been measured with this technique, and shows a mean scatter of about 2%. This technique is particularly appropriate for fluids of low viscosity. (Author)

AD-612 864 Div. 30, 25

Georgetown Univ., Washington, D. C.
ANALYSES OF YTTRIUM SPECTRA,
by Arthur B. Hook and Matthew P. Thekaekara.
10 Jun 64, 9p
Unclassified report

Pub. in Optical Society of America. Journal (U. S.) v54 n12 p1445-51 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Yttrium, Atomic spectroscopy), (*Atomic spectroscopy, Data processing systems), (*Spectra (Visible and Ultraviolet), Yttrium), (*Data processing systems, Atomic spectroscopy), Analysis, Data, Tables, Atomic energy levels, Line spectrum.

A near automatic method has been developed for data handling and analysis in atomic spectroscopy. Plate factors are determined by a least-squares solution of 100 standard lines by using a polynomial up to the fifth degree. Catalogs of predicted lines are made from known energy level schemes, and classifications of new lines are suggested. The method has been applied to the visible spectrum of yttrium as produced by electrodeless

discharge tubes. A total of 977 new lines has been measured with an accuracy of 0.005 A in the wavelength range 4600 to 6400 A, which is usually masked by oxide bands; 162 of these lines have been classified in terms of the known energy level system. (Author)

AD-612 872 Div. 30
CFSTI Prices: HC$2.00 MF$0.50

Southwest Research Inst., San Antonio, Tex.
EXPERIMENTAL STRESS ANALYSIS OF A ONE-SIXTH SCALE MODEL OF AN ANECHOIC PRESSURE VESSEL.
Final rept.,
by W. R. Schmidt and A. G. Pickett. 8 May 64, 40p
Contract Nonr370400, Proj. 03 1178
Unclassified report

Descriptors: (*Anechoic chambers, Model tests), (*Stresses, Mathematical analysis), (*Pressure vessels, Anechoic chambers), Model tests, Spheres, Experimental data, Design.

An experimental stress analysis was made to confirm the design feasibility of a double wall 40-foot diameter spherical pressure vessel to be used as an anechoic chamber. Electrical resistance strain gages were used to measure strains on the surface of the test article, a one-sixth scale model of the anechoic vessel, for several possible combinations of internal pressure, annulus pressure and dead weight loads.

AD-612 873 Div. 30, 2
CFSTI Prices: HC$4.00 MF$0.75

Southwest Research Inst., San San Antonio, Tex.
FEASIBILITY STUDY FOR A LARGE HIGH PRESSURE ANECHOIC TANK.
Final rept.,
by R. C. DeHart and N. L. Basdekas. 31 Jan 63, 107p
Proj. 11783
Unclassified report

Descriptors: (*Anechoic chambers, Feasibility studies), (*Underwater equipment, Test facilities), (*Oceanographic equipment, Test facilities), Materials, Steel, Plastics, Maraging steels, Metal plates, Mechanical properties, Thickness, Welding, Costs, Design, Spheres, Manufacturing methods.

A feasibility study was made for an anechoic tank for testing instruments capable of operating in a deep-sea environment. Attention was given to vessel opening details, materials, fabricating procedures, auxiliary equipment, and costs. Only 40-foot diameter spherical vessels were considered, and cost data were developed as a function of the internal pressure the vessel is capable of withstanding. It was required that the tank have a 5- to 10-foot diameter access opening which can be rapidly opened and closed.

AD-612 888 Div. 30, 15
CFSTI Prices: HC$11.15 MF$3.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THEORY OF RANDOM FUNCTIONS AND ITS APPLICATION TO PROBLEMS OF AUTOMATIC CONTROL,
by V. S. Pugachev. Nov 59, 815p
F-TS-9546, pts. 1-3
TT 60-19094; TT 60-19095
Unclassified report

Trans. of mono. Teoriya Sluchainykh Funktsii i Ee Primenenie k Zadacham Avtomaticheskogo Upravleniya, Moscow, 1957, 659p.

Descriptors: (*Statistical functions, Theory), (*Control systems, Automatic), Probability, Distribution theory, Numerical analysis, Entropy, Vector analysis, Transformations (Mathematics), Linear systems, Nonlinear systems, Tables, Textbooks, USSR.

This book offers a systematic presentation of the applied theory of random functions and probability methods in the theory of automatic control (statistical dynamics of systems of automatic control). The latest methods of investigating the accuracy of systems of automatic controls, operating under the influence of arbitrary random disturbances, both stationary and nonstationary, are set forth. Methods for investigating the accuracy are provided not only for unidimensional but also for multidimensional systems having any arbitrary number of inputs and outputs. A considerable portion of the book is devoted to methods for investigating the accuracy of nonlinear systems. Special attention is given to modern methods of determining the optimum characteristics of systems of automatic control (methods of statistical synthesis of systems of automatic control), based on the general theory of approximation of random functions. The theory of random functions and the probability methods of the theory of automatic control are set forth in this book chiefly on the basis of the author's own work. (Author)

AD-612 889 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
INVESTIGATIONS INTO THE THEORY OF AN ITERATIVE CIRCUIT STORED PROGRAM PARALLEL PROCESSOR. PART I,
by Serafino Amoroso. Feb 65, 22p
Technical rept. ECOM-2552
Proj. 1A010501B010
Unclassified report

Descriptors: (*Programming (Computers), Modules (Electronic)), (*Modules (Electronic), Programming (Computers)), (*Digital computers, Iterative methods), Computer logic.

The investigation of a highly parallel network of logical modules under control of a stored program is started. A given set of machine instructions is reduced to a minimum without relinquishing any theoretical processing capability. (Author)

AD-612 906 Div. 30, 1
CFSTI Prices: HC$2.00 MF$0.50

Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
PRELIMINARY DESIGN CONSIDERATIONS FOR A V/STOL WIND TUNNEL.
Final rept. for 1 Jul 63-31 Aug 64,
by Marcus P. Knowlton. Jan 65, 40p
Contract AF33 657 12174, Proj. 8219, Task 821907
FDL TDR-64-146
Unclassified report

Descriptors: (*Wind tunnels, Design), Airplane models, Vertical take-off planes, Short take-off planes, Power, Costs, Cooling, Honeycomb cores.

The report describes a tandem test section low speed wind tunnel and the attributes and design considerations of using either an open return or closed return. Power and cost estimates are made. (Author)

AD-612 920 Div. 30, 23
CFSTI Prices: HC$5.00 MF$1.00

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
PROCEEDINGS OF THE ANNUAL CONFERENCE COMPUTER PERSONNEL RESEARCH GROUP (2ND), HELD AT NEW YORK UNIVERSITY, JULY 20-21 1964.
Computer Personnel Research Group Communique vol. 2, no. 1,
comp. by Robert A. Dickmann. 1964, 168p TG-619
Contract NOw62 0604c
Unclassified report

Descriptors: (*Computer personnel, Symposia), (*Programmers, Symposia), Computers, Test methods, Performance (Human), Selection, Personnel management, Training, Data processing systems, Tests.

Contents:
Summary report on nationwide testing effort, by Robert N. Reinstedt
Predicting success in programmer training, by A. J. Biamonte
Levels of programmer jobs, by Charles D. Lothridge
Predicting programmer performance among non-preselected trainee groups, by Malcolm Gotterer and Ashford W. Stalnaker
A programmer appraisal instrument, by Robert A. Dickmann
Computer personnel selection and criteria development, by Raymond F. Berger
Computer professionalism: myth or fact, by Robert P. Rich
Problems in administrative leadership in the computer field, by Paul Armer
Data processing management: is it unique., by John P. Jones
A computer manager speaks: 'My problems are...' by David B. Mayer
Open discussion on computer manager problems
Outline of procedure to standardize the Programmer Appraisal Instrument, by Olinda L. Elliott.

AD-612 923 Div. 30, 25
CFSTI Prices: HC$1.00 MF$0.50

Harvard Coll., Cambridge, Mass. Observatory.
SHOCK TUBE SPECTROSCOPY LABORATORY.
Annual rept.,
by W. H. Parkinson and E. M. Reeves. Feb 65, 6p
Contract Nonr186648
Unclassified report

Also see AD-433 547.

Descriptors: (*Shock tubes, Design), (*Spectroscopy, Shock tubes), High temperature research, Band spectrum, Titanium compounds, Fluorides, Absorption spectrum, Calcium, Aluminum, Iron.

Spectra of calcium, aluminum and iron were obtained in a temperature range 1500 to 2500 degrees over the wavelength region 2450 to 1650A from a carbon tube furnace. The results are compared to the results obtained from shock tubes.

AD-612 940 Div. 30, 26
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
TIME-SHARING SYSTEMS: REAL AND IDEAL.
Professional paper,
by Louis Gallenson and Clark Weissman. 11 Mar 65, 20p Rept. no. SP-1872
Contract SD97
Unclassified report

Descriptors: (*Data processing systems, Real time), (*Programming (Computers), Scheduling), (*Scheduling, Programming (Computers)), Command and control systems, Systems engineering, Digital computers, Remote control systems, Computer storage devices, Optimization, Management engineering.

To aid in future design for large-scale, general-purpose, computer time-sharing systems, an appraisal of the existing SDC Time-Sharing System (TSS) shows that improvements for increased user satisfaction may be made in continuity of system operation, responsiveness of the system to interrogation, and accessibility to users' programming through many different languages and at input-output consoles located remote from the computer. Continuity of operation depends upon reliable equipment, particularly peripheral input-output devices, and upon a reliable TSS executive program, 10% of which is devoted to responding to a wide variety of hardware, program, and user's errors. Though the mean-time-to-failure of the system is important, the mean-time-to-discontinuity (short periods of less than a minute when the system stops operating) is also of serious import. About 7% of the TSS executive and about 25% of the executive operate time is devoted to the scheduling of user's programs, so that system responsiveness, called the 'response cycle,' is within 2 seconds of a user's query. The TSS response cycle is dependent upon many things; particularly, how much operate time, called a quantum, is given to each user and how much time is spent swapping programs between drums and core for each user.

AD-612 941 Div. 30, 32
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
ANALYZING ENGLISH SYNTAX WITH A PATTERN-LEARNING PARSER.
Professional paper,
by Keren McConlogue and Robert F. Simmons.
5 Feb 65, 43p Rept. no. SP-1950
Contract SD97
Unclassified report

Descriptors: (*Vocabulary, Pattern recognition), (*Language, Analysis), (*Pattern recognition, Vocabulary), Programming (Computers).

A dependency analysis system based on pattern recognition and learning logic was developed to infer word-classes and rules of syntactic combination from experience with text which had been analyzed. The characteristics used to form word-classes are the depth in the dependency tree of each word, the direction of its governor, and the same features for each of its immediate neighbors. Syntactic rules of combination show the relation of a word to its governor in the depth pattern of the sentence. The system was tested on 400 elementary Basic English sentences including 300 used earlier by Knowlton in a different learning parser. The Pattern Learning Parser was able to derive a grammar which in a second pass allowed completely correct parsing of all 400 sentences. After experience with 300 sentences it was able to generalize with 77% accuracy to the next 100. In accumulative learning trials after the first 200 sentences it averaged a probability of .9 for accurately parsing each new sentence it encountered. It was concluded that the system was adequate for learning to parse the bulk of Basic English but that further development is required before conclusions about its application to ordinary English can be stated. The system is operational and available on the ARPA/SDC time-shared Q-32 computing system. (Author)

AD-612 942 Div. 30, 26
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.

COMPUTER STATUS QUO.
Professional paper,
by Robert L. Patrick. 15 Dec 64, 40p
Rept. no. SP-1947

Unclassified report

Descriptors: (*Computers, Data processing systems), (*Data processing systems, Management engineering), (*Management engineering, Data processing systems), Systems engineering, Operations research, Reviews.

Describes the status of a research study entitled 'Automated System Implementation (ASI)'. Outlines the history of the computing field from 1946 to 1964. Reports that thinkers are beginning to concern themselves with the nontechnical aspects of the computing and programming profession. States that social responsibility, certification, formal establishment of a profession, and application of the 'scientific method' to these endeavors are of notable concern. (Author)

AD-612 944 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
A PROGRAM DISASSEMBLER,
Professional paper,
by Beverly A. Erickson. 9 Feb 65, 22p
Rept. no. SP-1807

Unclassified report

Descriptors: (*Programming (Computers), Analysis).

The concept of a program disassembler is presented. One of a series of programming tools associated with assembly, reassembly, and symbolic program patching, the disassembler is designed to provide a symbolic counterpart of the binary program modified by corrections. Each of the programs in the series of tools, their inputs, and their outputs are described briefly. The interrelation of all of the programs in the series is discussed. The operation of a disassembler program and its two outputs are described in more detail, using charts and program examples. The uses of a disassembler are outlined. (Author)

AD-612 946 Div. 30, 23
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
AUTOMATION, CYBERNETICS, AND EDUCATION.
Professional paper,
by John E. Coulson. 18 Mar 65, 15p SP-1964

Unclassified report

Presented at the Conference on Cybernetics in the School, held at the University of British Columbia, Vancouver, 20 Feb 65.

Descriptors: (*Cybernetics, Education), (*Education, Cybernetics), Data processing systems, Teaching machines, Computers, Students, Decision making, Management planning, Information retrieval, Automation.

This paper presents an overview of recent developments in automation, cybernetics, and data-processing technology that have direct relevance for the future of education. The discussion focuses on the use of computers to provide individualized instruction, but consideration is also given to the application of data-processing equipment to process fiscal accounts and administrative records, to provide automated analysis and assessment of student cumulative records, and to assist in administrative planning. Research at SDC is used to illustrate these developments and their relevance to education. (Author)

AD-612 947 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
A SUMMARY OF AN ANALYSIS OF COMPUTER PROGRAMMING COST FACTORS.
Technical memo,
by Leonard Farr and Henry J. Zagorski. 25 Jan 65, 24p TM-1447/002/00
Contract AF19 628 3418

Unclassified report

Descriptors: (*Programming (Computers), Costs), (*Costs, Programming (Computers)), Management engineering, Operations research, Statistical analysis.

Results of an exploratory analysis aimed at deriving better cost-estimating relationships for computer programming are presented. Based upon previous work that hypothesized an initial list of factors affecting cost, this report describes the collection and analysis of data for the purpose of evaluating the presumed factors. Initial equations for estimating costs in terms of such resources as man months and computer hours were derived. However, these prediction devices were evolved from a small and, perhaps, unrepresentative sample of programs. As a result, the equations have large standard errors, i.e., the reliability of an estimate calculated from the equations is low. Therefore, their use is not recommended for actual planning. However, their experimental use is suggested and encouraged. The study demonstrates the usefulness of multivariate regression analysis for deriving programming cost-estimating relationships. To improve the prediction equations, recommendations are made toward revising the data collection questionnaire, extending the survey to a larger and more representative sample, and broadening the investigation into other needed areas of program development. (Author)

AD-612 950 Div. 30, 23
CFSTI Prices: HC$1.00 MF$0.50

Office of Aerospace Research, Washington, D. C.
RESEARCH-TECHNOLOGY COUPLING IN AIR FORCE IN-HOUSE LABORATORIES. A REVIEW OF SOCIAL-SCIENCE-RESEARCH FINDINGS AS OF JULY 1964.
Monographs no. 2,
by H. J. Sander. Jan 65, 15p OAR-65-1

Unclassified report

Descriptors: (*Air Force research, Management engineering), (*Scientific personnel, Air Force research), (*Research program administration, Personnel management), Social sciences, Motivation, Civilian personnel, Performance (Human), Laboratories.

This is a review of recent social-science research relevant to the OAR management responsibility for stimulating research scientists in Air Force laboratories to greater personal participation in relating research knowledge to technological and operational problems. A summary of tentative findings includes the following: (a) the promotion and stimulation of increased research-technology coupling is the mutual responsibility of management in both research and applied-technology laboratories; (b) such coupling activities may occupy from 15% to 30% of a research scientist's time without reducing his research productivity; (c) there is evidence of greater willingness on the part of scientists to engage in coupling activities than there are opportunities and mechanisms for doing so as provided by management; (d) essential requirements are: an atmosphere of free, two-way communication between management and research scientists; significant participation by scientists in the decision of what research they are to perform, and almost unrestricted

freedom in day-to-day research activities; (e) given a fair salary and promotion opportunity reasonably competitive with academic and industrial research organizations, the most important incentives are personal and professional---opportunity for self-development, professional recognition, creativity and accomplishment. (Author)

AD-612 955 Div. 30, 32
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
SDC RESEARCH AND TECHNOLOGY DIVISION EXTERNAL PUBLICATIONS 1961-1964,
by C. Baum and V. P. Herold. 30 Jan 65, 21p
Rept. no. TM-698/064/00

Unclassified report

Descriptors: (*Operations research, Systems engineering), (*Systems engineering, Bibliographies), (*Data processing systems, Systems engineering), (*Artificial intelligence, Systems engineering), Reports, Periodicals, Classification, Information retrieval, Programming (Computers), Education, Decision making, Pattern recognition, Programming languages, Bionics.

A list is presented of SDC's Research and Technology Division publications in journals, proceedings and books from January 1961 through December 1964. The bibliography does not include minor external publications--book reviews, abstracts, research summaries, nor the several hundred papers published in SDC document series during this period. (Authors)

AD-612 977 Div. 30, 2, 16

Dalhousie Univ., Halifax (Nova Scotia).
A VACUUM-ASSISTED SUBSAMPLER FOR USE WITH SMALL PLANKTONIC ORGANISMS,
by Robert A. McHardy. 3 Dec 63, 2p

Unclassified report

Pub. in Fisheries Research Board. Journal (Canada) v21 n3 1964 (Copies available only to DDC users).

Descriptors: (*Plankton, Samplers), (*Samplers, Plankton), Collecting methods, Vacuum apparatus, Statistical data, Nova Scotia.

AD-612 978 Div. 30, 16

RAND Corp., Santa Monica, Calif.
SIMULATION OF A BIOLOGICAL SYSTEM ON AN ANALOG COMPUTER,
by Edward C. De Land. 1962, 11p
Rept. no. P-2307

Unclassified report

Pub. in International Analogue Computation Meetings (3rd) Opatija, Sep 61. p375-84 1962.

Descriptors: (*Analog computers, Bionics), (*Bionics, Analog computers), (*Respiratory system, Mathematical models), Simulation, Blood, Lungs, Respiration, Blood plasma, Erythrocytes, Partial differential equations, Differential equations, Numerical analysis.

This paper demonstrates a method for simulating complex chemical equilibria and uses the respiratory function of the blood at the lung surface as an example. The analog computer is employed because its characteristic parallel computation and its fast solution-time enable the simulation of dynamic systems in real time. The results obtained for a small model indicate that the accuracy and stability are sufficient for analysis within the laboratory experimental error. The method is very flexible; basic models may be expanded to incorporate more complex phenomena. The digital computer gives results which are more accurate and reproducible but it has a slower solution time. This mathematical model of a biological system is the first in a series of simulations which will become successively more complex and, hence, more realistic representations of the biological system. (Author)

AD-612 998 Div. 30, 26, 32
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
SDC DOCUMENTS APPLICABLE TO STATE AND LOCAL GOVERNMENT PROBLEMS,
comp. by Joel M. Kibbee. 16 Feb 65, 18p
Rept. no. TM-2025/000/01
Proj. 99000

Unclassified report

Descriptors: (*Management planning, Data processing systems), (*Systems engineering, Bibliographies), Information retrieval, Documentation, Programming (Computers), Education, Training, Urban planning, Simulation, Hospitals, Operations research, Reports.

A selective list is presented of SDC publications available to external requesters. The list is organized by substantive categories and alphabetically by author within each category. The categories include the administration of justice, bio-medical systems, computer program systems, development of computer-based systems, education and training, information retrieval, simulation in experimentation, and urban information systems. (Author)

AD-613 003 Div. 30, 15, 18
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
UNCERTAINTIES IN OPERATIONS RESEARCH,
by Charles Hitch. 25 Apr 60, 14p
Rept. no. P-1959

Unclassified report

Descriptors: (*Operations research, Decision making), Game theory, Probability, Costs, Effectiveness, Defense systems.

AD-613 007 Div. 30, 2, 22
CFSTI Prices: HC$1.00 MF$0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SOIL SHOCK TUBE TECHNIQUES, PART I,
by Andrew A. Thompson. Mar 61, 11p
BRL-TN-1396
Proj. 503 04 002

Unclassified report

Descriptors: (*Shock waves, Sand), (*Shock tubes, Sand), (*Soils, Explosion effects), (*Test methods, Explosion effects), Seismic waves, Soil mechanics, Simulations, Velocity, Attenuation, Stress (Mechanics), Strain (Mechanics), Time, Graphics, Terminal ballistics.

Experiments were conducted on propagation of seismic energy in sand at higher stress levels using the sandfilled shock tube. The attempt to simulate the plastic waves that occur close to a large explosion were more successful than expected. Some examples of the results are given in this Technical Note. (Author)

AD-613 020 Div. 30
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
HAND-HELD SHOCK TESTER WOX-6A,
by John E. Messner. 29 Oct 64, 41p NOLTR-64-203
Unclassified report

Descriptors: (*Shock (Mechanics), Test equipment), (*Test equipment, Shock (Mechanics)), Accelerometers, Shock resistance, Test methods, Portable, Operation, Environmental tests.

A 5.1-pound shock tester the size of a hand tool is described. For items the weight of piezoelectric accelerometers, the tester produces shock pulses ranging from 400 g to 1000 g peak with durations of one millisecond and velocity changes up to 15 fps. In operation, two 6.2-ounce, constant-load spring motors accelerate a small, 77.5-gram test vehicle and payload down a 6-inch barrel at a maximum impact velocity of 10 fps. Impact is against a thin rubber disk bonded to a high-impact nylon plastic spring. The hand grip of the tester makes up 80 percent of the tester weight and is the reaction mass for the shock vehicle. (Author)

AD-613 022 Div. 30, 2, 22

Ballistic Research Labs., Aberdeen Proving Ground, Md.
PRELIMINARY PLANE WAVE STUDIES IN THE EARTH SHOCK TUBE,
by Andrew A. Thompson. Sep 60, 9p
Technical note no. BRL-TN-1343
Proj. 5B03 04 002
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Shock waves, Sand), (*Shock tubes, Sand), (*Sand, Shock waves), Mechanical waves, Propagation, Velocities, Stress (Mechanics), Strain (Mechanics), Graphics, Terminal ballistics.

Propagation velocities of plane waves were measured on a series of shots in a three-foot diameter sand-filled tube. The experiments were run without redistribution of the sand, and further compaction occurred with each shot. The propagation velocity increased with successive shots. The stress-time and strain-time measurements at three feet from the plane wave source are given for Shot 10. The rise times of the stress and strain were so fast that the accuracy of the stress-strain plots are limited in the region of rising stress. It was felt that the stress-strain relation derived from smoothed curves might be more significant. The strain represents an average strain over 10 inches of material. The propagation velocity measured on Shot 10 was 745 feet per second. The specific gravity of the sand material was measured at about 1.8.

AD-613 060 Div. 30
CFSTI Prices: HC$6.00 MF$1.50

Case Inst. of Tech., Cleveland, Ohio.
LOGIC OF CONTROLLED THRESHOLD DEVICES.
Final rept.,
by H. F. Klock and R. D. Haney. Feb 65, 250p
Contract AF30 602 2518, Proj. 5519, Task 551901
RADC TDR-64-173
Unclassified report

See also AD-297 862.

Descriptors: (*Computer logic, Control sequences), (*Control sequences, Computer logic), Synthesis, Data storage systems, Gates (Circuits), Digital computers, Matrix algebra.

The synthesis of threshold logic circuits from several points of view is presented. The first approach is applicable to resistor-transistor networks in which the outputs are tied to a common collector resistor. In general, fewer threshold logic gates than NOR gates connected to a common collector resistor are required. Synthesis techniques based upon the use of Boolean matrices are presented. In this case the goal of the synthesis is a network to realize a specified function such that the failure of any but the output gate can be compensated for by a change in the threshold level (and possibly changes in the weights of the inputs). In general, the ability to compensate for a failure requires the synthesis of a network with more gates than if no compensation were required. The net result is that the synthesis is an involved procedure. A mechanism for changing weights of threshold gates using a photo-diode matrix is presented. The design of the control system for an IBM type 350 disc file is presented as an illustration of the design of a practical system in which threshold logic is employed. The function of the control system is to position the read-write heads over the specified track of a specified disc to read in or to read out data. Less logic circuitry is required if threshold logic rather than NOR logic is used. (Author)

AD-613 105 Div. 30

Air Force Cambridge Research Labs., Bedford, Mass.
RESEARCH IN COMPUTER SCIENCES,
by Hans H. Zschirnt. Feb 65, 27p
Special rept. no. SR-21, AFCRL-65-101
Proj. 5632
Unclassified report

Pub. in Air University Review (U.S.) v16 n1 p47-66 Nov-Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Computers, Data processing systems), (*Data processing systems, Computers), (*Information retrieval, Theory), (*Artificial intelligence, Digital computers), Military requirements, Human engineering, Pattern recognition, Programming (Computers), Programming languages, Cybernetics, Display systems.

Contents: Some properties of digital computers, some aspects of artificial intelligence, problem solving and games, pattern recognition, man/machine interface, new concepts-new machines.

AD-613 143 Div. 30

General Dynamics/Astronautics, San Diego, Calif.
AVOIDING ERRONEOUS SUBMICRON PRESSURE READINGS: A REFRIGERATED MCLEOD,
by Erhard W. Rothe. 2 Jul 64, 4p
Rept. no. D12-115D
Unclassified report

Pub. in Journal of Vacuum Science and Technology (U. S.) v1 n2 np Nov/Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pressure gages, Helium group gases), (*Ionization gages, Calibration), Errors, Corrections, Mercury, Cooling.

A modified McLeod pressure gauge was designed and tested.

AD-613 155 Div. 30

Harvard Univ., Cambridge, Mass.
MULTIPLE MOLECULAR BEAMS,

by C. H. Anderson, M. Baker, and N. F. Ramsey.
24 Aug 64, 2p

Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v36 n1 p57-8 Jan 1965 (Copies not available to DDC or Clearinghouse customers)
Supported in part by the National Science Foundation and the Office of Naval Research.

Descriptors: (*Molecular beams, Multiple operation), Intensity, Collimators, Magnetic resonance, Instrumentation.

A multiple molecular beam technique is described in which a series of beams are used in parallel in a single apparatus to increase total beam intensity while retaining a high sensitivity to small deflections. The particular arrangement used had a single source slit and multiple collimator and detector slits arranged such that 19 beams transversed the three meter machine, each 0.012 mm wide at the collimator and spaced 0.032 mm apart. (Author)

31. Ships and Marine Equipment

AD-612 467 Div. 31
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge. Dept. of Naval Architecture and Marine Engineering.
THE EFFECT OF ANTIPITCHING FINS ON THE MOTIONS AND VIBRATION OF A LARGE AIRCRAFT CARRIER.
Final rept.,
by Damon E. Cummings. Sep 64, 76p
Rept. no. 64-16
Contract Nonr184168, Proj. SR009 01 01

Unclassified report

Descriptors: (*Aircraft carriers, Motion), (*Ship structural components, Stabilization systems), Pitch (Motion), Vibration, Roll, Ocean waves, Turbulence, Inhibition, Control, Ship hulls, Mathematical analysis.

The effect of ship motions on the useful operational time of an aircraft carrier is discussed. The ship is assumed to be in regular sinusoidal waves and the linearized pitch and heave equations are solved with the help of a digital computer. The results are compared with those found in the towing tank with a model. The effect of an antipitching fin is discussed and solved for in the linear equations. These results are compared with those from tank tests. Various types of activation of the fin are tested with the linear theory computer program to improve the performance of the fin. Vibration of the bow due to ventilation of the fin was observed in tank tests and a pressure relieving hole was tested in the towing tank as a possible means of reducing this vibration. Since two of the criteria for operation in rough seas are the vertical excursion and vertical velocity of the touchdown point, the effect of the fin in reducing the motion of this point is calculated for sea state six and a ship speed of twenty-four knots. (Author)

AD-612 734 Div. 31
CFSTI Prices: HC$0.75 MF$0.50

Naval Research Lab., Washington, D. C.
BACKGROUND FOR MECHANICAL SHOCK DESIGN OF SHIPS SYSTEMS,
by G. J. O'Hara. 12 Mar 65, 23p
Report no. NRL-6267

Unclassified report

Descriptors: (*Marine engineering, Shock resistance), (*Shock resistance, Ships), (*Ships, Shock resistance), Shock (Mechanics), Design, Failure (Mechanics), Test methods.

The report describes some of the progress made since World War II in the several areas related to the complex set of problems encountered in shock design and analysis of shipboard systems. It discusses: requirements for shock protection, selection of failure criteria, determination of shock environment, development of analysis and design procedures, results from past research and engineering, and the needs for future research and engineering. Essentially it sketches the evolution from the simple shock design number concept, which is limited, to a more rational approach which can allow the shock design-analysis of unprecedented equipment. (Author)

AD-612 809 Div. 31, 13
CFSTI Prices: HC$1.00 MF$0.50

Naval Boiler and Turbine Lab., Philadelphia, Pa.
RAINMAKER FEEDWATER AND STEAM CONDENSATE QUALITY OF NAVAL SHORE INSTALLATIONS.
Final evaluation rept.,
by B. E. Kelley. 17 Mar 65, 21p NBTL-A-573
Proj. SR007 08 08, Task 0613

Unclassified report

Descriptors: (*Feed water, Contamination), (*Naval shore establishments, Feed water), (*Ships, Water supplies), Silicon compounds, Oxides, Calcium, Magnesium, Quality control, Boilers.

Waterside deposits of 1200 psi boilers containing higher than normal amounts of calcium, magnesium and particularly, silica were believed caused by ships' employment of 'rainmaker' feedwater and shore steam. The quality of feedwater and steam condensate supplied ships by various shore installations was evaluated. It was found that some samples contained excessive contamination. Shipboard testing of contamination in feedwater, with the exception of dissolved silica, is practical. Certification of feedwater low dissolved silica content should be required of shore supplier. (Author)

32. Miscellaneous Arts and Sciences

AD-612 512 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
CURRENT COMMUNIST TACTICS IN INDONESIA,
by Guy J. Pauker. 4 Apr 61, 19p
Rept. no. P-2254

Unclassified report

Prepared for pub. in Asian Survey (U. S.) May 1961.

Descriptors: (*Communism, Indonesia), (*Indonesia, Communism), Leadership, Government (Foreign), Labor, Economics, Armed forces (Foreign), Population, History.

AD-612 556 Div. 32

Osaka Univ. (Japan).
ON EQUILIBRIUM FOR A MULTI-SECTOR MODEL OF INCOME PROPAGATION.
Revised ed.,
by David Gale. 15 Oct 63, 19p
Reprint series no. ISER-29
Proj. NR047 018

Unclassified report

Pub. in International Economic Review (Japan) v5 n2 p185-200 May 1964 (Copies available only to DDC users)
Revision of rept. dated 17 Jun 63.

Descriptors: (*Economics, Mathematical models), (*Mathematical models, Economics), Wages, Consumption, Production, Distribution (Economics).

AD-612 557 Div. 32, 15

Osaka Univ. (Japan).
BALANCED GROWTH IN MULTI-SECTORAL INCOME PROPAGATION UNDER AUTONOMOUS EXPENDITURE SCHEMES,
by Hukukane Nikaido. 1964, 21p
Reprint series no. ISER-25

Unclassified report

Pub. in Review of Economic Studies (Scotland) v31 n1 p25-42 1964 (Copies available only to DDC users).

Descriptors: (*Economics, Mathematical models), Stability, Operators (Mathematics), Matrix algebra, Topology.

AD-612 595 Div. 32, 18
CFSTI Prices: HC$1.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
THE QUALITATIVE DEVELOPMENT REQUIREMENTS INFORMATION (QDRI) REGISTERED ORGANIZATION DATA BANK (RODATA),
by James G. Peirce and Charles Beugless.
Mar 65, 20p Memo rept. no. M65-13-1

Unclassified report

Descriptors: (*Army, Documentation), (*Data storage systems, Army), (*Data processing system, Army), (*Information retrieval, Army).

The QDRI Program is the Army's research and development information-to-industry program, which has been assigned to the U. S. Army Materiel Command for management. QDRI is defined as information (written or verbal) regarding current and future Army requirements for development of materiel exclusive of advanced procurement information. It has become apparent to most of the managers of the QDRI program that there are enough items of data being collected about qualified organizations and from the information interfaces between the Army and Industry to require the development of an automated data system to acquire, store and process commonly needed information in a uniform manner, and in addition certain specialized information for individual Army installations, which data might be useful to other installations under varying circumstances. There is enough evidence to indicate that a QDRI oriented data bank can be designed and be put into partial operation by the end of FY 1965, using existing technology and equipment available to the AMC installations involved in the QDRI program. In the development of the QDRI Managers Guide, the concept of a data bank for QDRI continuously crystallized into the description now presented. This data bank will be an information science oriented operation, using primarily existing operational IBM equipment and the existing AUTODIN/AUTOVON network for rapid transmission of data from each RDTE and procurement qualification activity/installation, and vice-versa.

AD-612 674 Div. 32, 30

Bureau of Ships, Washington, D. C.
PROJECT SHARP (SHIPS ANALYSIS AND RETRIEVAL PROJECT). INFORMATION STORAGE AND RETRIEVAL SYSTEM: COMPUTER ASPECTS AND PROGRAMS.
Dec 64, 91p NAVSHIPS-0900-001-4000
Proj. SF007 01 03, Task 0404

Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.50, as D211.2:SH2/2.
Rept. originally prepared at David Taylor Model Basin, Washington, D. C., Rept. no. 1923.

Descriptors: (*Information retrieval, Programming (Computers)), (*Documentation, Computers), Libraries, Catalogs, Bibliographies, Subject indexing, Periodicals, Reports, Search theory, Handling, Storage, Automatic.

SHARP is a computer oriented information storage and retrieval system developed to resolve some of the problems inherent in the handling, storage and retrieval of scientific and technical literature at the Bureau of Ships Technical Library. The computer is being used to automate to a high degree, (1) bibliographic searches (2) subject matter searches (3) coordinated searches (combinations of both) (4) issuance of library catalog cards and accessions bulletins (5) control of periodicals and journals (6) other aspects under development, such as, complete automatic generic computer searching, automatic posting of descriptive terms by the computer in the indexing procedure, and user interest registers. The system is intended to improve the library's capacity to better serve the user and to function as a management and logistics tool for the library. Details of the computer aspects of the indexing scheme, search strategy, thesaurus, computer programs, present research work are reported. Modifications to the system and future plans are indicated. (Author)

AD-612 685 Div. 32
CFSTI Prices: HC$7.75 MF$2.25

Historical Evaluation and Research Organization, Washington, D. C.

STUDY 'RIPOSTE'.
Historical papers, annex vol. 2, pt. 1.
12 Apr 64, 476p
Contract GC17

Unclassified report

See also AD-612 688, AD-612 690, AD-612 695.

Descriptors: (*Arms control, History), (*Disarmament, History), (*Political science, Arms control), Safety, Economic warfare, USSR, France, Great Britain, United States Government.

Contents:
Negotiation and enforcement of multilateral agreements, by Richard M. Leighton
Post-1815 alliance system as an instrument of collective enforcement and collective security, by Richard M. Leighton
Negotiation and enforcement of major peace settlements after World Wars I and II, by Richard M. Leighton and Grace P. Hayes
Quest for disarmament, 1919-1939, by Raymond G. O'Connor
Enforcement problem in disarmament negotiations, 1945-1963, by Richard M. Leighton
Statute for the International Atomic Energy Agency, by Robert M. Langdon
Antarctic Treaty of 1959, by Howard J. Taubenfeld
League of Nations and sanctions, by Howard J. Taubenfeld
Disarmament of Germany after World War I, by Wlodzimierz Onacewicz
Soviet-German and Soviet-British-Frence negotiations in 1939, by Wlodzimierz Onacewicz
United States responses to treaty violations by the use of sanctions, 1931-1941, by Raymond G. O'Connor

AD-612 686 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

Computer Science Div., Stanford Univ., Calif.
ENGLISH EQUIVALENTS OF METALINGUISTIC TERMS OF RUSSIAN ALGOL,
2 Mar 65 8p Technical rept. no. CS-19
Contract Nonr225 37 Proj. NR044 211
TT 65-61839

Unclassified report

Trans. from mono. Osnovy Algoritmicheskogo Yazyka Algol-60 (Principles of the Algol-60 Algorithmic Language) Moscow, 1964.

Descriptors: (*Programming languages, USSR), Documentation, Vocabulary.

The Russian versions of the metalinguistic terms of ALGOL 60 are listed in Russian alphabetical order, together with the English originals. (Author)

AD-612 688 Div. 32
CFSTI Prices: HC$7.00 MF$1.75

Historical Evaluation and Research Organization, Washington, D. C.
STUDY 'RIPOSTE'.
Historical papers, annex vol. 2, pt. 2.
12 Apr 64, 317p
Contract GC17

Unclassified report

See also AD-612 685, AD-612 695.

Descriptors: (*Arms control, History), (*Disarmament, History), (*Political science, Arms control), Economic warfare, United Nations, United States Government, Berlin, South Korea, North Korea, Foreign policy, Law.

Contents:
The use of sanctions under the United Nations Charter, by Howard J. Taubenfeld and Grace P. Hayes
The application of sanctions under the Inter-American Treaty of Reciprocal Assistance, by William Manger
Agreements on Berlin : violation and response, by Jean Edward Smith
Korean armistice agreement, by Martin Blumenson
Sanction of nonrecognition as practiced by the United States, by Raymond G. O'Connor

AD-612 689 Div. 32
CFSTI Prices: HC$5.00 MF$1.00

Historical Evaluation and Research Organization, Washington, D. C.
STUDY 'RIPOSTE'.
Analytical papers, annex vol. 3.
12 Apr 64, 166p
Contract GC17

Unclassified report

See also AD-612 688, AD-612 695.

Descriptors: (*Arms control, History), (*Disarmament, History), (*Political science, Arms control), Analysis, Public opinion, Communism, USSR, United States.

Contents:
The role of public opinion, by R. Ernest Dupuy
Public opinion: its definition, formation, stimulation, and analysis, by R. Ernest Dupuy
Public opinion in the Soviet Union, by Wlodzimierz Onacewicz
Public opinion and the problems of arms control, by Theodore Ropp
Special factors in negotiation and enforcement of agreements with Communist nations, by Francis H. Heller
Patterns of treaty violation, by Raymond G. O'Connor
A group of treaty violations in depth: The Treaty of Versailles, by Stefan T. Possony
Patterns of responses to treaty violations, by Albert J. Espain and Gay M. Hammerman.

AD-612 690 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

Historical Evaluation and Research Organization, Washington, D. C.
STUDY 'RIPOSTE'.
Theoretical papers, annex vol. 1.
12 Apr 64, 87p
Contract GC17

Unclassified report

See also AD-612 695.

Descriptors: (*Arms control, History), (*Disarmanent, History), (*Political science, Arms control), Theory, United Nations, Economic warfare, Limited war, Law.

Contents:
The rationale of treaty law and treaty negotiations, by Albert J. Esgain
International law defined
Sources of international law
Conventional international law
The nature of international law: its binding effect
Functions and objectives of treaties: why states conclude treaties

Negotiations
Signature and ratification of treaties
The legal effect of treaties
How treaties come to an end
The theory and practice of sanctions, by Howard J. Taubenfeld
Sanctions in legal theory
Sanctions in practice (and theory of practical sanctions).

AD-612 695 Div. 32
CFSTI Prices: HC$6.00 MF$1.25

Historical Evaluation and Research Organization, Washington, D. C.
STUDY 'RIPOSTE'. RESPONSES TO VIOLATIONS OF ARMS CONTROL AND DISARMAMENT AGREEMENTS.
12 Apr 64, 225p
Contract GC17

Unclassified report

See also AD-612 685, AD-612 688 through AD-612 690.

Descriptors: (*Arms control, History), (*Disarmament, History), (*Political science, Arms control), USSR, United States Government, Public opinion, Communism, Cold War.

Contents:
Treaties and their enforcement
Arms control and the nature of treaties
Enforcement of treaties and agreements
Modern treaty experience
Treaties and international organizations between the world wars
Treaties and international organizations after World War II
Recent Western-Communist agreement experience
Analysis of modern treaty experience
Public opinion and treaty experience
Observations on cold war negotiating experience
Patterns of treaty violations
Patterns of responses
The relevance of historical experience
Modern treaty trends
Arms control significance of treaty experience
Thoughts for the future

AD-612 700 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
JAPAN'S RELATIONS WITH CHINA; A LOOK INTO THE FUTURE,
by Paul F. Langer. Feb 65, 17p
Rept. no. P-3071

Unclassified report

Descriptors: (*Japan, Foreign policy), Government (Foreign), Attitudes, Culture, History, China, Commerce, Economics, Communism, Leadership.

Japan's increasing interest in establishing a positive and autonomous foreign policy, particularly with respect to China, is examined. Japan's reactions to China are viewed in terms of cultural and geographic proximity, economic relations, and current political contacts. Some implications for U. S. policies are also outlined.

AD-612 701 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Co., Santa Monica, Calif.
THE SOVIET POLICY TOWARDS INDONESIA ON THE WEST IRIAN AND THE MALAYSIAN DISPUTES,
by Nadia Derkach. Mar 65, 12p
Rept. no. P-3081

Unclassified report

Descriptors: (*USSR, Foreign policy), Southeast Asia, Indonesia, Communism, Government (Foreign), Leadership, Newspapers, Attitudes.

Conclusions: Soviet support of the Indonesian confrontation with Malaysia on the model of support on the West Irian dispute would have the following costs: it would disturb the detente with the United States (which did not exist earlier), and it would foreclose the possibility of useful Soviet relations with Malaysia in the future. It would also force the Soviet Union to choose sides between two new states and thus incur disapproval of such new states as the United Arab Republic which already recognizes Malaysia. Open approval of Indonesian dispatch of guerrillas into Malaysia would place the Soviet Union in a position of sanctioning the 'export of revolution,' a practice the Soviets publicly disclaim. Open opposition to the Indonesian policy would prove the Chinese contention that the Soviet Union has no genuine interest in national liberationist movements and would guarantee Chinese dominant influence in Indonesia. The Soviets would run counter to the policy of the Communist Party of Indonesia which has identified itself with the confrontation policy. The Soviets have, therefore, adopted a compromise policy of grudging support for the Indonesians on the Malaysian issue.

AD-612 722 Div. 32, 23
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A GLIMPSE OF THE CHINESE LANGUAGE: PEKING'S LANGUAGE REFORMS AND THE TEACHING OF CHINESE IN THE UNITED STATES,
by Francis Shieh. Mar 65, 32p Rept. no. P-3078

Unclassified report

Descriptors: (*Language, China), (*Education, Language), Vocabulary, Speech representation, Universities, United States, History.

An informative general survey of the history, evolution, and current usage of the written Chinese language is presented. Three major systems of romanization for written Chinese are given along with a comparative key to these systems, a table of simplified Chinese characters, an index to Chinese phonetics, a list of Chinese radicals, and a list of the Old National Phonetic Symbols. The teaching of Chinese in the United States and opportunities available for study of the language are also discussed.

AD-612 723 Div. 32, 18
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
COST ESTIMATES AS PREDICTORS OF ACTUAL WEAPON COSTS: A STUDY OF MAJOR HARDWARE ARTICLES,
by Robert Summers. Mar 65, 74p
RM-3061-PR (Abridged)
Contract AF49 638 700

Unclassified report

Descriptors: (*Costs, Weapons), (*Weapons, Costs), Mathematical prediction, Air force operations, Statistical analysis, Errors, Management planning, Reliability.

This is a statistical study of military cost estimates aimed at decreasing the uncertainties about their interpretation and use. Based on a sample of 68 cost estimates of major hardware articles in 22 weapon systems, it assesses their accuracy as predictors of actual costs. In section 1 the aims and scope of the study are given along with a detailed summary of methods and results. Section 2 presents the statistical analysis of estimating errors, and section 3 shows quantitatively that the observed errors can significantly affect the choice between alternative systems. The grosser differences between estimated and actual costs disappear when the estimated costs are adjusted (1) to refer to the actual quantities of the items procured, and (2) to take account of the secular change in the level of prices. But even these 'adjusted' estimates exhibit great variability; in the samples studied they range from 15 per cent to about 150 per cent of actual costs. They are also systematically biased, about four-fifths of the adjusted estimates being below actual costs. The study identifies the situations in which variability is likely to be large, and presents a numerical method for 'debiasing' the estimates so that (although still variable) they are no more likely to be low than high. The important parameters are (1) the time the estimate is made in relation to the development program, (2) the degree of technological advance required, and (3) the length of the development period. (Author)

AD-612 729 Div. 32, 15
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Los Angeles.
A UTILITY FUNCTION DERIVED FROM A SURVIVAL GAME,
by Karl Borch. Feb 65, 13p Working Paper no. WP-66
Contract Nonr23375, Proj. NR047 041
Unclassified report

Research supported in part by the Ford Foundation.

Descriptors: (*Commerce, Decision making), (*Game theory, Economics), (*Economics, Game theory), Dynamic programming, Decision theory, Stochastic processes, Management engineering, Operations research.

A simple problem is solved of economic survival, closely related to the classical problem of the gambler's ruin. It is shown that the solution to this problem can be interpreted as a utility function in the sense of Von Neumann and Morgenstern. This means that the solution to the dynamic problem automatically gives one the solution to a class of static problems of decision making under uncertainty. The starting point of the paper is a firm engaged in a risky business. The policy which will maximize the expected discounted value of the dividends which the firm can pay before it goes bankrupt. It is then shown that the solution of the dividend problem gives a utility function which governs the firm's decisions under uncertainty. From this it appears that a number of decisions which seem irrational when studied in isolation become perfectly rational when seen in their proper dynamic setting.

AD-612 730 Div. 32, 15
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Los Angeles.
THE ECONOMICS OF UNCERTAINTY II,
by Karl Borch. Feb 65, 21p Working paper no. WP-67
Contract Nonr23375, Proj. NR047 041
Unclassified report

See also AD-612 356, AD-612 731.

Descriptors: (*Game theory, Commerce), (*Commerce, Game theory), (*Economics, Game theory), Decision making, Theory, Probability, Statistical distributions, Gain.

The paper contains a general discussion of economic decisions under certainty and under uncertainty. It is demonstrated that decision rules can be derived from underlying preference orderings, which in some cases can be represented by utility functions. (Author)

AD-612 731 Div. 32, 15
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Los Angeles.
THE ECONOMICS OF UNCERTAINTY III AND IV,
by Karl Borch. Feb 65, 37p
Working paper no. WP-69
Contract Nonr23375, Proj. NR047 041
Unclassified report

See also AD-612 356, AD-612 730.

Descriptors: (*Game theory, Commerce), (*Commerce, Game theory), (*Economics, Game theory), Decision making, Theory, Probability, Statistical distributions.

The paper gives a simple proof of the Expected Utility theorem (The Bernoulli Principle) following the line of reasoning used in more classical economic theory. The assumptions required to prove the theorem are discussed briefly, and some decision rules which do not satisfy the assumptions are presented. The implications of the Bernoulli Principle are discussed in some detail. It is shown how different attitudes to risk can be represented by different classes of utility functions. (Author)

AD-612 803 Div. 32, 26
CFSTI Prices: HC$8.35 MF$2.50

Army Missile Command, Redstone Arsenal, Ala.
Directorate of Procurement and Production.
THE EXPERIENCE CURVES. VOL. I. 67% THROUGH 84%.
Revised ed.
Nov 64, 531p
Unclassified report

Revision of rept. dated Sep 62.
Available copy will not permit fully legible reproduction.
Reproduction will be made if requested by users of DDC.
Copy is available for public sale.
See also AD-612 804.

Descriptors: (*Economics, Theory), (*Production control, Theory), (*Manpower studies, Theory), Inventory control, Inventory analysis, Management control systems, Costs, Tables, Graphics.

The experience curve, or the learning or improvement curve, is based on the theory that each time the total quantity of units produced is doubled, the hours or cost to produce the last unit of this doubled quantity will be reduced by a constant percentage. A 20% decrease in the effort to produce double quantities is referred to as an 80% slope, a 15% decrease as an 85% slope. The pattern of experience curve is hyperbolic when drawn on arithmetical graph paper and is a straight line when drawn on logarithmic (log-log) paper. Factors that contribute to the decline of the unit cost as cumulative production increases are: (1) workers become more familiar with the job due to repetition; (2) development of more efficient tools and machines; (3) improvement in organization and management; and (4) solution of engineering problems.

CONTENTS: What is the experience curve; solution of the experience curve using empirical data; examples of experience curve calculations using empirical data; definition of terms; procedures for the use of the experience curve factor tables; experience curve factor tables: 67 through 84%.

AD-612 804 Div. 32, 26
CFSTI Prices: HC$7.30 MF$2.00

Army Missile Command, Redstone Arsenal, Ala. Directorate of Procurement and Production.
THE EXPERIENCE CURVES. VOL. II. 85% THROUGH 99%.
Revised ed.
Nov 64, 430p
Unclassified report

Revision of rept. dated Sep 62.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
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See also AD-612 803.

Descriptors: (*Economics, Theory), (*Production control, Theory), (*Manpower studies, Theory), Inventory control, Inventory analysis, Management control systems, Costs, Tables, Graphs.

AD-612 853 Div. 32, 15, 30

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
INEFFICIENCY OF THE USE OF BOOLEAN FUNCTIONS FOR INFORMATION RETRIEVAL SYSTEMS,
by J. Verhoeff, W. Goffman, and Jack Belzer.
1960, 3p
Contract AF49 638 357
AFOSR 1775
Unclassified report

Pub. in Communications of the ACM (U. S.) v4 n12 p557-9 Dec 61 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Information retrieval, Special functions (Mathematical)), (*Special functions (Mathematical), Information retrieval), Probability, Set theory, Indexes, Optimization, Effectiveness.

It is shown why, in general, boolean functions are not applicable in information retrieval systems.

AD-612 917 Div. 32

Department of Justice, Washington, D. C.
IDENTICAL BIDDING IN PUBLIC PROCUREMENT.
Rept. no. 3 of the Attorney General under Executive Order 10936.
Feb 65, 345p
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $2.00, as J1.31:965.

Descriptors: (*Government procurement, Bargaining), (*Bargaining, Costs), United States Government, Materials, Propellants, Fuels, Commerce, Industrial production, Statistical data.

Although the projected volume of advertised public procurement believed to have been affected by identical bidding in 1963 was approximately the same as that projected for 1962 ($155 million), the volume of procurement reported under the Executive order declined 18.6 percent from $65.6 million in 1962 to $53.4 million in 1963; the number of identical bid reports filed, fell from 2,550 in 1962 to 1,675 in 1963, a decline of 34 percent; the number of line items reported declined by 25 percent from 3,329 in 1962 to 2,504 in 1963; and the number of firms submitting identical bids fell from 3,032 in 1962 to 2,503 in 1963, a decline of 17 percent. On its face these figures suggest that significant progress was made in 1963 in reducing the incidence of identical bidding in public procurement. However, the sector of public procurement in which the sharpest decline occurred was at the State and local government level where the reporting of identical bids is voluntary and therefore less disciplined than is the reporting by Federal agencies which is mandatory under the Executive order. The experience of Federal agencies in 1963 is, therefore, believed to be more indicative of the trend of identical bidding in public procurement than is the experience of other levels of government.

AD-612 945 Div. 32, 30
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
LANGUAGE: AN OVERVIEW OF A RANGE OF VIEWPOINTS,
Professional paper,
by Louise Schultz. 30 Nov 64, 37p Rept. no. SP-1732
Unclassified report

Descriptors: (*Language, Reviews), Communication theory, Coding.

With the expanding interest by mathematicians and data processing specialists in a field formerly reserved to the social or behavioral scientist, an attempt is made to summarize the variations in approach taken to the study of language by the linguist, the behaviorist, and the statistician. SUMMARY: To communicate optimally with automatic symbol manipulation (or data processing) equipment, it is shown that we must know vastly more about communicating via symbols than we have known. The search for needed knowledge is categorized as (1) logistic -- specification of syntax and semantics of symbols; (2) linguistic -- discovery of syntax from observation of symbol events and inference of semantics; (3) psychologic -- discovery of semantics and pragmatics from analysis of symbol events and syntax. Examination of the directions of study emphasizes the paucity of knowledge of language and range and depth of opportunity that remain in man's study of this tool.

AD-612 997 Div. 32, 26, 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
USER-ORIENTED INFORMATION SYSTEMS FOR STATE AND LOCAL GOVERNMENT.
Professional paper,
by Herbert H. Isaacs. 5 Mar 65, 23p
Rept. no. SP-1988
Unclassified report

Descriptors: (*Information retrieval, Management planning), (*Management planning, Information retrieval), Documentation, Systems engineering, Computers, Data processing systems, Programming (Computers), Government procurement, Operations research, Urban planning, Real time, Costs, Statistical data.

Potential state and local government users of information systems are classified in terms of categories

of activities and levels of organizational function. The general information requirements of these users are described and categorized in terms of basic system capabilities. The existing situation in state and local government information systems is then described, indicating a need for more advanced, user-oriented techniques. Such methods and techniques currently available or under research and development are then surveyed. Brief descriptions are given of basic ideas or operating principles, along with reference to more detailed documentation. The paper concludes with several recommendations on how best to maximize transfer of knowledge, evaluate new procurements, and carry out new system design. (Author)

AD-613 001 Div. 32, 18
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE POLITICS OF NATO DEFENSE ARRANGEMENTS,
by Herbert S. Dinerstein. Feb 65, 12p
Rept. no. P-3070
Unclassified report

Descriptors: (*Western Europe, Foreign policy), (*USSR, Foreign policy), Defense systems, Government (Foreign), Political science, Cold war, Leadership, Attitudes, Deterrence, France, Great Britain, West Germany, United States.

The political goals of the major members of NATO and of the Soviet Union are examined.

AD-613 028 Div. 32, 15, 26, 30
CFSTI Prices: HC$1.00 MF$0.50

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
DEMON, MARK II: AN EXTREMAL EQUATION APPROACH TO NEW PRODUCT MARKETING.
Final rept.,
by A. Charnes, W. W. Cooper, J. K. DeVoe, and D. B. Learner. 17 Dec 64, 22p
Management Sciences Research rept. no. MSRR-29
Contracts Nonr122810, Nonr76024, Projs. NR047 021, NR047 048
Unclassified report

See also AD-414 521, AD-612 187.

Descriptors: (*Decision making, Economics), (*Economics, Decision making), Management engineering, Probability, Equations, Production, Distribution, Optimization, Mathematical analysis, Operations research.

Numerous alternatives are available in the kinds of studies which can be elected in the market research which should precede the introduction of a new product. This gives rise to a possible network interpretation and treatment by an associated chance-constrained programming characterization and analysis. The resulting model, called DEMON (Decision Mapping Via Optimum GO-NO Networks, AD-612 187) is replaced by an approach based on extremal equations. A general analytic characterization is achieved and then replaced by more special ones. Means for effecting study decisions and inferences are discussed along with the sensitivity analyses that we associate with GO and NO preemptions, relative to profit and payback constraints. Payback (in a constraint) is here distinguished from its use as a criterion for choice (or objective) , the latter being here oriented toward MEMP (maximize expected maximum profit). (Author)

AD-613 087 Div. 32

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
CAUSATIVE FORMS IN JAPANESE,
by S. Y. Kuroda. 1964, 21p
Grants NSF G16526, NIH MH04737 03
Unclassified report

Pub. in Foundations of Language (Netherlands) v1 p30-50 1965 (Copies available only to DDC users).

Descriptors: (*Language, Japan), Analysis, Theory, Speech representation.

The report introduces six transformations and clarifies their mutual order in the grammar as follows: Intransitivization; ni-Causativization; o-Causativization; Recurring-object Deletion; o-Adjustment; Implicit Understanding. Intransitivization and Implicit Understanding are optional and Recurring-object Deletion and o-Adjustment are obligatory. ni-Causativization and o-Causativization are optional with a condition that, if Intransitivization has been applied, one of them is obligatorily applied.

AD-613 100 Div. 32

California Univ., Berkeley.
STUDIES ON AIR-ION-ENHANCED IRON CHLOROSIS. I. ACTIVE AND RESIDUAL IRON,
by A. P. Krueger, S. Kotaka, and P. C. Andriese.
13 Apr 64, 12p
Contract Nonr365606; Grant PHS AP00002 05
Unclassified report

Pub. in International Journal of Bioclimatology and Biometeorology (Netherlands) v8 n1 p5-16 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plants (Botany), Cytochemistry), (*Cytochemistry, Plants (Botany)), Iron, Air, Ions, Seeds, Cereals, Biochemistry, Enzymes, Biosynthesis, Chlorophylls, Growth substances.

The effects of positive and negative air ions on the active and residual iron fractions of barley seedlings were studied during the course of iron chlorosis. Active iron is that fraction localized in the chloroplasts which dissolves in 1.0 N HC1 and participates in the biosynthesis of chlorophyll. Residual iron is not soluble in 1.0 N HC1 and is not concerned with the biosynthesis of chlorophyll. Air ions of either charge induced a significant decrease in active iron content which was associated with a decrease in chlorophyll content. Concomitantly there occurred an increase in both the residual iron and the cytochrome c fractions of the seedlings. There is evidence that the rise in residual iron content may involve not only cytochrome c but also other cytochromes and iron-containing enzymes as well. We have theorized that the site of air ion action in the experiments reported may be the regulatory systems controlling iron metabolism in the seed and young seedling. Through this action air ions apparently divert endogenous free-state iron from conversion to active iron and make it available for the production of a number of iron-containing compounds which are components of the residual iron fraction.

33. Transportation

No Entries

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown below.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown on the next page.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
LL 1964 63
(ESD TDR64 566)
AD-608 288 DIV. 8

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The AD-Division Index is arranged numerically by AD number and lists the subject division where the full entry can be located in TAB.

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TRANSLATION OF RUSSIAN RESEARCH: TRANSACTIONS OF CENTRAL SCIENTIFIC AND RESEARCH INSTITUTE OF GEODESY, AERIAL PHOTOGRAPHY, AND CARTOGRAPHY, 1962, VOL. 146 (SELECTED ARTICLES).
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LINCOLN LAB MASS INST OF TECH LEXINGTON
AD-612 937 DIV. 15

•AF19 604 7499
MICROWAVE RESEARCH INST POLYTECHNIC INST OF BROOKLYN N Y
PIBMRI 1251 65
(AFCRL 65-116)
AD-612 965 DIV. 8
PIBMRI 1243 64
(AFCRL 65-86)
AD-613 037 DIV. 25

•AF19 604 7983
RHODE ISLAND UNIV KINGSTON
SR 5
(AFCRL 65-94)
AD-612 654 DIV. 25

•AF19 604 7996
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFCRL 65-22)
F AD-612 681 DIV. 2

•AF19 604 8072
PLASMA PHYSICS RESEARCH LAB UNIV OF MINNESOTA MINNEAPOLIS
(AFCRL 64-5601)
F AD-612 471 DIV. 25

•AF19 628 1679
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF TEXAS AUSTIN
EERL 6 62
(AFCRL 65-82)
F AD-613 038 DIV. 2

•AF19 628 2351
GEOSCIENCE INC LEXINGTON MASS
(AFCRL 65-9)
AD-612 609 DIV. 8

•AF19 628 2392
NEW HAMPSHIRE UNIV DURHAM
SR 4
(AFCRL 65-13)
AD-612 704 DIV. 30

•AF19 628 2406
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
SR 7
(AFCRL 65-6)
AD-612 631 DIV. 8
SR 8
(AFCRL 65-87)
AD-612 632 DIV. 8
SR 5
(AFCRL 65-5)
AD-612 643 DIV. 8

•AF19 628 2419
PARKE MATHEMATICAL LABS INC CARLISLE MASS
SR 4
(AFCRL 64-935)
AD-612 810 DIV. 25

•AF19 628 2792
CENTER FOR ATMOSPHERIC AND SPACE PHYSICS UNIV OF MARYLAND COLLEGE PARK
TR 414
(AFCRL 65-54)
AD-613 065 DIV. 2

•AF19 628 325
STANFORD RESEARCH INST MENLO PARK CALIF
(AFCRL 64-891)
F AD-613 011 DIV. 8

•AF19 628 3281
GENERAL ATRONICS CORP PHILADELPHIA PA
1367 2004 10
(ESD TDR-64-679)
F AD-612 634 DIV. 5

•AF19 628 3308
STANFORD RESEARCH INST MENLO PARK CALIF
SR 1
(AFCRL 65-112)
AD-613 035 DIV. 2

•AF19 628 333
HUGHES AIRCRAFT CO CULVER CITY CALIF
SR 4 P64 131
(AFCRL 65-49)
AD-612 757 DIV. 8

•AF19 628 3395
PHILCO CORP WILLOW GROVE PA COMMUNICATIONS AND ELECTRONICS DIV
(ESD TDR-65-167)
F AD-612 801 DIV. 30

•AF19 628 3418
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
TM 1497/002/00
AD-612 947 DIV. 30

•AF19 628 3807
ELECTRONICS RESEARCH LAB MONTANA STATE COLL BOZEMAN
ERL 8 0009 622
(AFCRL 64-972)
F AD-612 535 DIV. 30

•AF19 628 3808
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV
(AFCRL 65-27)
AD-612 705 DIV. 25

•AF19 628 3826
PARKE MATHEMATICAL LABS INC CARLISLE MASS
SR 2
(AFCRL 65-28)
AD-612 633 DIV. 8

•AF19 628 3834
ENGINEERING RESEARCH LAB UNIV OF ARIZONA TUCSON
SR 1
(AFCRL 65-53)
AD-612 683 DIV. 8

•AF19 628 3862
RAYTHEON CO WALTHAM MASS RESEARCH DIV
S 702
(AFCRL 64-946)
F AD-612 707 DIV. 25

•AF19 628 3880
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS
T R 459
(TT 65-61832)
AD-612 483 DIV. 4
T R 457
(TT 65-61833)
AD-612 497 DIV. 4

•AF19 628 421
LITTLE (ARTHUR D) INC CAMBRIDGE MASS
AD-613 018 DIV. 2

•AF19 628 4329
MICROWAVE RESEARCH INST POLYTECHNIC INST OF BROOKLYN N Y
PIBMRI 1251 65
(AFCRL 65-116)
AD-612 965 DIV. 8
PIBMRI 1227 64
(AFCRL 65-85)
AD-612 635 DIV. 8

•AF19 628 447
UTAH UNIV SALT LAKE CITY
(AFCRL 65-471)
AD-612 816 DIV. 2

•AF19 628 494
RAYTHEON CO WAYLAND MASS
(AFCRL 64-985)
F AD-613 048 DIV. 8

•AF19 628 496
RAYTHEON CO WAYLAND MASS
ADVANCED DEVELOPMENT LAB
(AFCRL 64-987)
F AD-612 789 DIV. 8

•AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
GR 1965 3
(ESD TDR-65-28)
AD-612 537 DIV. 8
(ESD TDR-65-47)
AD-612 541 DIV. 20
GR 1965 6
(ESD TDR-65-45)
AD-612 769 DIV. 20
(ESD TDR-65-50)
AD-612 773 DIV. 25
GROUP REPT. NO. 1965 8
(ESD TDR-65-48)
AD-612 796 DIV. 15
GR 1965 10
(ESD TDR-65-46)
AD-612 887 DIV. 6

•AF29 601 6213
GENERAL DYNAMICS FORT WORTH TEX
FZK 195
(WL TR-64-131)
F AD-612 466 DIV. 14
FZK 196
(WL TR-64-133)
F AD-612 604 DIV. 14

•AF29 601 6360
POULTER RESEARCH LABS STANFORD RESEARCH INST MENLO PARK CALIF
TR 001 65
AD-612 680 DIV. 25

•AF30 602 2518
CASE INST OF TECH CLEVELAND OHIO
(RADC TDR-64-173)
F AD-613 060 DIV. 20

•AF30 602 2796
FITEL-MCCULLOUGH INC SAN CARLOS CALIF
(RADC TR-65-14)
AD-612 911 DIV. 8

•AF30 602 2797
SPERRY MICROWAVE ELECTRONICS CO CLEARWATER FLA
(RADC TDR-64-432)
F AD-612 930 DIV. 8

•AF30 602 2868
MICROWAVE RESEARCH INST POLYTECHNIC INST OF BROOKLYN N Y
PIBMRI 1235 64
(RADC TDR-64-505)
AD-612 596 DIV. 8

•AF30 602 3085
GENERAL ELECTRIC CO SYRACUSE N Y
(RADC TDR64 454)
F AD-613 036 DIV. 8

•AF30 602 3122
PERKIN-ELMER CORP NORWALK CONN
ER 7600
(RADC TDR-64-365)
F AD-612 725 DIV. 25

•AF30 602 3147
STANFORD RESEARCH INST MENLO PARK CALIF
(RADC TR-64-515)
F AD-612 893 DIV. 8

•AF30 602 3187
AMERICAN ELECTRONIC LABS INC COLMAR PA
63096 5
(RADC TDR-64-493)
F AD-613 072 DIV. 8

•AF30 602 3261
WATKINS-JOHNSON CO PALO ALTO CALIF
(RADC TR-64-537)
AD-612 717 DIV. 8

•AF30 602 3332
WESTINGHOUSE ELECTRIC CORP BALTIMORE MD SURFACE DIV
(RADC TR-64-568)
AD-612 498 DIV. 4

•AF30 602 3335
AIRBORNE INSTRUMENTS LAB DEER PARK N Y
AIL 2732 1
(RADC TDR-64-521)
F AD-612 903 DIV. 8

•AF30 602 3348
SPERRY GYROSCOPE CO GREAT NECK N Y RADIATION DIV
EB 5287 0500 2
(RADC TDR-64-506)
AD-612 597 DIV. 8

•AF30 602 3478
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV
(RADC TR-64-517)
AD-612 703 DIV. 8

•AF33 600 42523
WESTERN GEAR CORP LYNWOOD CALIF
6410 230
(ML TR-64-371)
F AD-612 640 DIV. 26

•AF33 615 1049
WESTINGHOUSE ELECTRIC CORP YOUNGWOOD PA SEMICONDUCTOR DIV
AD-612 485 DIV. 25

•AF33 615 1083
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-613 113 DIV. 25
AD-612 710 DIV. 7

•AF33 615 1110
MICROWAVE ASSOCIATES INC BURLINGTON MASS
(AL TR-65-53)
F AD-612 538 DIV. 8

•AF33 615 1121
DEFENSE METALS INFORMATION CENTER COLUMBUS OHIO
DMIC 212
AD-612 490 DIV. 26
DMIC 200
AD-612 808 DIV. 14

•AF33 615 1177
BRUSH BERYLLIUM CO CLEVELAND OHIO
BBC TR 376 244
(ML TR-64-388)
AD-612 696 DIV. 17

•AF33 615 1266
GULTON INDUSTRIES INC METUCHEN N J
(APL TR-65-11)
F AD-612 492 DIV. 7

•AF33 615 1330
SPACE AND INFORMATION SYSTEMS DIV NORTH AMERICAN AVIATION INC DOWNEY CALIF
SID 64 2172
(APL TR-64-150)
F AD-612 905 DIV. 12

•AF33 615 1596
ITT INDUSTRIAL LABS FORT WAYNE IND
S 3312
AD-612 682 DIV. 8

•AF33 615 1934
STANFORD RESEARCH INST MENLO PARK CALIF
AD-612 797 DIV. 20

•AF33 615 1952
OPTICS TECHNOLOGY INC BELMONT CALIF
AD-612 902 DIV. 25

•AF33 615 2041
NATIONAL WATER LIFT CO GRAND RAPIDS MICH INSTRUMENTATION AND CONTROL OPERATIONS
(APL TR-65-5)
AD-613 049 DIV. 25

•AF33 615 2214
BUNKER-RAMO CORP CANOGA PARK CALIF
F AD-612 726 DIV. 28

•AF33 615 64 1009
BARTLESVILLE PETROLEUM RESEARCH CENTER BUREAU OF MINES OKLA
(APL TR-65-13 P1)
AD-612 468 DIV. 10

•AF33 616 61 02
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
TN 252
(ML TDR-64-257)
AD-612 812 DIV. 25

•AF33 616 7175
PITTSBURGH UNIV PA
(AMRL TR-64-128)
F AD-612 738 DIV. 23

•AF33 616 7835
IIT RESEARCH INST CHICAGO ILL
IITRI C191 33
(ASD TDR-63-846)
AD-613 040 DIV. 4

•AF33 616 8325
WESTINGHOUSE ELECTRIC CORP BLAIRSVILLE PA
(ML TR-64-387)
F AD-612 487 DIV. 17

•AF33 657 10208
LABORATORIES FOR RESEARCH AND DEVELOPMENT FRANKLIN INST PHILADELPHIA PA
F 82052
(ML TR-65-49)
F AD-612 786 DIV. 17

•AF33 657 10219
SPACE AND INFORMATION SYSTEMS DIV NORTH AMERICAN AVIATION INC DOWNEY CALIF
SID 64 43
(FDL TDR-64-251)
AD-613 081 DIV. 12

•AF33 657 10472
WESTINGHOUSE DEFENSE AND SPACE CENTER BALTIMORE MD
490F
AD-612 469 DIV. 25

•AF33 657 10474
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF ILLINOIS URBANA
AD-613 044 DIV. 8
AD-613 059 DIV. 8

•AF33 657 10668
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
LMSC A702683
(APL TR-64-132 P3 V1)
AD-612 460 DIV. 12

•AF33 657 10709
PURDUE UNIV LAFAYETTE IND SCHOOL OF ELECTRICAL ENGINEERING
(AL TR-65-12 V1 AND 2)
AD-612 909 DIV. 8
(AL TR-65-12 V 3)
AD-612 910 DIV. 8
(AL TR-65-12 V4)
AD-613 069 DIV. 8
(AL TR-65-12 V5)
AD-613 070 DIV. 8

•AF33 657 10939
LABORATORY FOR INSULATION RESEARCH MASS INST OF TECH CAMBRIDGE
AD-613 073 DIV. 25

•AF33 657 11127
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF
(ML TR-64-416)
F AD-612 912 DIV. 17

•AF33 657 11336
RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J
(AMRL TR-65-3)
F AD-613 075 DIV. 28

•AF33 657 12145
GEOTECHNICAL CORP GARLAND TEX
TR 65 17
AD-612 711 DIV. 6

•AF33 657 12174
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES
(FDL TDR-64-146)
F AD-612 906 DIV. 30

•AF33 657 7823
IIT RESEARCH INST CHICAGO ILL
ARF 3213 13
(ASD TDR-63-460)
F AD-612 679 DIV. 8

•AF33 657 8247
WESTINGHOUSE ELECTRIC CORP BLOOMFIELD N J
AD-613 046 DIV. 17

•AF33 657 8767
OKLAHOMA STATE UNIV STILLWATER RESEARCH FOUNDATION
(ASD TDR-63-754 P2)
A AD-612 958 DIV. 4

•AF33 657 9175
DAYTON UNIV OHIO RESEARCH INST
(APL TR-64-148)
AD-612 795 DIV. 10

•AF33 657 9186
MELPAR INC FALLS CHURCH VA
AD-612 792 DIV. 10

•AF33 657 9988
FLUID POWER CONTROLS LAB OKLAHOMA STATE UNIV STILLWATER
(SEG TR-64-74)
F AD-612 907 DIV. 14

•AF34 601 17361
OKLAHOMA STATE UNIV STILLWATER DEPT OF MECHANICAL ENGINEERING
F AD-612 904 DIV. 26

•AF41 609 1973
DELAWARE UNIV NEWARK
AD-613 134 DIV. 16

•AF49 638 1017
RIAS INC BALTIMORE MD
(AFOSR 3651)
AD-612 520 DIV. 25

•AF49 638 1094
IIT RESEARCH INST CHICAGO ILL
AD-612 671 DIV. 10

•AF49 638 1113
ELECTRONICS RESEARCH LABS COLUMBIA UNIV NEW YORK
T 1/306
AD-612 963 DIV. 18

•AF49 638 1125
RADIATION APPLICATIONS INC LONG ISLAND N Y
RAI 347
(AFOSR 65-0429)
F AD-612 536 DIV. 10

•AF49 638 1200
OPTICS TECHNOLOGY INC BELMONT CALIF
(AFOSR 65-0445)
AD-612 637 DIV. 24

•AF49 638 1206
RIAS INC BALTIMORE MD
(AROD 2603:16)
AD-612 868 DIV. 15

•AF49 638 1242
RIAS INC BALTIMORE MD
(AFOSR 65-0319)
AD-612 456 DIV. 15

•AF49 638 1266
ANTENNA LAB CALIF INST OF TECH PASADENA
TR 33
(AFOSR 65-0391)
AD-612 594 DIV. 8

•AF49 638 1287
BELL AEROSYSTEMS CO BUFFALO N Y
9139 933002
(AFOSR 65-0431)
F AD-612 698 DIV. 10

•AF49 638 1323
PALOMAR OBSERVATORY PASADENA CALIF
(AFOSR 65-0396)
AD-612 579 DIV. 2

•AF49 638 1337
SEISMOLOGICAL LAB CALIF INST OF TECH PASADENA
AD-612 859 DIV. 2

•AF49 638 1402
MICROWAVE RESEARCH INST POLYTECHNIC INST OF BROOKLYN N Y
PIBMRI 1250 64
AD-612 642 DIV. 30

•AF49 638 159
LABORATORIES FOR RESEARCH AND DEVELOPMENT FRANKLIN INST PHILADELPHIA PA
F A2026
(AFOSR 2345)
F AD-612 629 DIV. 17

•AF49 638 253
PRINCETON UNIV N J
(AROD 3076:11)
AD-612 839 DIV. 15

•AF49 638 357
CENTER FOR DOCUMENTATION AND COMMUNICATION RESEARCH WESTERN RESERVE UNIV CLEVELAND
(AFOSR 1775)
AD-612 853 DIV. 32

•AF49 638 415
MICROWAVE LAB STANFORD UNIV CALIF
ML 880
(AFOSR 2121)
AD-612 628 DIV. 8

•AF49 638 420
ILLINOIS UNIV URBANA
(AFOSR 2788)
AD-613 111 DIV. 17

•AF49 638 430
COLUMBIA UNIV NEW YORK
TN 7
(AFOSR 3888)
AD-612 874 DIV. 25

•AF49 638 545
YALE UNIV NEW HAVEN CONN
(AFOSR 2791)
AD-612 522 DIV. 20

•AF49 638 547
ARKANSAS UNIV FAYETTEVILLE
(AFOSR 3549)
AD-612 575 DIV. 20

•AF49 638 571
SYRACUSE UNIV N Y
(AFOSR 65-0348)
AD-612 565 DIV. 15

•AF49 638 580
JOHNS HOPKINS UNIV BALTIMORE MD SCHOOL OF MEDICINE
(AFOSR 3443)
AD-612 455 DIV. 16

•AF49 638 600
CALIFORNIA UNIV BERKELEY
(AFOSR 3411)
AD-613 118 DIV. 25

•AF49 638 639 GRANT
OKLAHOMA UNIV NORMAN
AD-612 530 DIV. 25

•AF49 638 700
RAND CORP SANTA MONICA CALIF
RM 4483 PR
AD-612 622 DIV. 12
RM 3898 PR
AD-612 699 DIV. 15
RM 3061 PR (ABRIDGED)
AD-612 723 DIV. 32
RM 4357 PR
AD-612 724 DIV. 12
RM 4312 PR
AD-612 739 DIV. 18

•AF49 638 708
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFOSR 3144)

AD-612 855 DIV. 25
(AFOSR 3599)
AD-612 982 DIV. 9
(AFOSR 2461)
AD-613 145 DIV. 9

•AF49 638 761
INSTITUTE FOR AEROSPACE STUDIES UNIV OF TORONTO (ONTARIO)
(AFOSR 3598)
AD-613 139 DIV. 12

•AF49 638 803
INSTITUTE FOR THE STUDY OF METALS UNIV OF CHICAGO ILL
(AFOSR TN-60-921)
AD-612 517 DIV. 25

•AF49 638 842
SYDNEY UNIV (AUSTRALIA)
(AFOSR 3166)
AD-612 975 DIV. 20

•AF61 052 107
PISA UNIV (ITALY)
(AFOSR J194)
AD-612 981 DIV. 16

•AF61 052 202
OXFORD UNIV (ENGLAND)
AD-612 871 DIV. 25
(AFCRL 65-106)
F AD-612 984 DIV. 25
AD-612 985 DIV. 25

•AF61 052 229
BRUSSELS UNIV (BELGIUM)
(WADD TR-60-782 P26)
AD-612 780 DIV. 4

•AF61 052 226
UPPSALA UNIV (SWEDEN) GEODETIC INST
(AFCRL 65-95)
F AD-613 012 DIV. 2

•AF61 052 248
GOTEBORG UNIV (SWEDEN)
(AFOSR 2119)
AD-612 854 DIV. 16

•AF61 052 461
GENOA UNIV (ITALY)
(AFOSR J703)
AD-612 870 DIV. 16

•AF61 052 595
JOHANNES GUTENBERG-UNIVERSITAET MAINZ (GERMANY)
SR 3
(AFCRL 65-109)
AD-612 708 DIV. 2

•AF61 052 677
CLARENDON LAB UNIV OF OXFORD (ENGLAND)
SR 5
(AFCRL 65-120)
AD-612 655 DIV. 25

•AF61 052 753
SOREQ RESEARCH ESTABLISHMENT ISRAEL ATOMIC ENERGY COMMISSION YAVNEH
SR 1
AD-612 612 DIV. 25
SR 2
AD-612 613 DIV. 25

•AF61 052 764
BRUSSELS UNIV (BELGIUM)
(WADD TR-60-782 P26)
AD-612 780 DIV. 4

•AF61 514 1125
PISA UNIV (ITALY)
(AFOSR J194)
AD-612 981 DIV. 16

•ARDS510
BENDIX-PACIFIC DIV BENDIX CORP NORTH HOLLYWOOD CALIF
(SRDS RD-64-125)
F AD-612 610 DIV. 19

•AT11 1 1328 GRANT
THEORETICAL CHEMISTRY INST UNIV OF WISCONSIN MADISON
AD-613 157 DIV. 25

•DA ARO D31 124 660
HEBREW UNIV JERUSALEM (ISRAEL)
(AROD 3034:11)
AD-612 745 DIV. 25

•DA ARO D31 124G276
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
(AROD 2360:32)
AD-612 577 DIV. 25
NEW YORK UNIV N Y
AD-612 867 DIV. 25

•DA ARO D31 124G345
MICHIGAN UNIV ANN ARBOR COLL OF ENGINEERING
05170 2 T
AD-612 929 DIV. 22

•DA ARO D31 124G928
IIT RESEARCH INST CHICAGO ILL
IITRI A6075
(AROD 4518:1)
F AD-612 900 DIV. 25

•DA AROD31 124G172
PENNSYLVANIA UNIV PHILADELPHIA
(AROD 3090:23)
AD-612 586 DIV. 4
(AROD 3090:22)
AD-612 587 DIV. 4
(AROD 3090:7)
AD-612 588 DIV. 4

•DA AROD31 124G194
NORTH CAROLINA UNIV CHAPEL HILL
(AROD 3091:4)
AD-612 591 DIV. 25

•DA AROD31 124G203
DETROIT UNIV MICH
(AROD 3523:6)
AD-612 590 DIV. 30

•DA AROD31 124G344
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
(AROD 3069:4)
AD-612 667 DIV. 25

•DA AROD31 124G60
NORTH CAROLINA UNIV CHAPEL HILL
(AROD 3034:12)
AD-612 581 DIV. 25

•DA AROD31 124G61
WASHINGTON UNIV SEATTLE
(AROD 2441:13)
AD-612 592 DIV. 25

•DA AROD31 124G642
CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY
(AROD 3580: 13)
AD-612 580 DIV. 4
(AROD 3580:14)
AD-612 669 DIV. 4
AD-612 670 DIV. 4

•DA TC44 1776G
RENSSELAER POLYTECHNIC INST TROY N Y
TR AE 6303
F AD-612 787 DIV. 25

•DA02 086AMC00232R
PAN AMERICAN WORLD AIRWAYS INC TUCSON ARIZ
AD-612 926 DIV. 6

•DA11 022ORD2917
GENERAL TECHNOLOGY CORP ELGIN ILL
TR 1 22
AD-612 664 DIV. 25

•DA11 190ENG22
BARODYNAMICS INC GEORGETOWN COLO
(CRREL TR-711)
F AD-612 875 DIV. 22

•DA18 035AMC107A
ATOMICS INTERNATIONAL CANOGA PARK CALIF
AI 65 36
AD-612 677 DIV. 20

•DA18 108AMC214A
LITTON SYSTEMS INC ST PAUL MINN APPLIED SCIENCE DIV
2711
AD-612 659 DIV. 3

•DA18 108CM16622
TEMPLE UNIV PHILADELPHIA PA SCHOOL OF PHARMACY
R 29
S AD-612 800 DIV. 4

•DA22 079ENG316
NORTHWESTERN UNIV EVANSTON ILL TECHNOLOGICAL INST
AD-613 071 DIV. 2

•DA23 072ORD1251
SOUTHWEST RESEARCH INST SAN ANTONIO TEX
TR 1
AD-612 783 DIV. 27
TR 3
AD-612 784 DIV. 27
TR 10
AD-612 785 DIV. 27

•DA28 017AMC995A
SPACE SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA
R64SD90
AD-612 788 DIV. 25

•DA28 043AMC00294E
CINCH MFG CO CHICAGO ILL RESEARCH AND DEVELOPMENT DEPT
AD-612 890 DIV. 8

•DA28 043AMC00350E
VARIAN ASSOCIATES BEVERLY MASS
AD-612 933 DIV. 8

•DA30 069ORD3743
TITANIUM METALS CORP OF AMERICA NEW YORK
(WAL TR-905-2-7)
AD-612 477 DIV. 17

•DA30 690RD2581
NEW YORK UNIV N Y
AD-613 127 DIV. 20

•DA31 124 AROD94
DEFENSE RESEARCH CORP SANTA BARBARA CALIF
(AROD 4157-2)
AD-612 527 DIV. 15

•DA31 124ARO D114
ILLINOIS UNIV URBANA
AD-612 755 DIV. 25

•DA31 124ARO D155
STANFORD ELECTRONICS LABS STANFORD UNIV CALIF
(AROD 2895-14)
AD-612 932 DIV. 25

•DA31 124ARO D262

LTV VOUGHT AERONAUTICS DIV
LING-TEMCO-VOUGHT INC DALLAS
TEX
2 53310/3R 2172
(AROD 5260:3)
AD-612 927 DIV. 9

•DA31 124ARO D98
WASHINGTON UNIV SEATTLE
(AROD 3076:6)
AD-612 585 DIV. 15

•DA31 124ARO D68
UNIVERSITY OF SOUTHERN CALIFORNIA
LOS ANGELES
(AROD 4040:1)
AD-612 747 DIV. 4

•DA31 124AROD114
ILLINOIS UNIV URBANA DEPT
OF PHYSICS
AD-612 754 DIV. 25

•DA31 124ARO D98
WASHINGTON UNIV ST LOUIS
MO
(AROD 3076:7)
AD-612 584 DIV. 15

•DA36 039AMC0221X
PIAS INC BALTIMORE MD
(AROD 2603-18)
AD-612 570 DIV. 15
(AROD 2603:16)
AD-612 868 DIV. 15

•DA36 039ORD3471X
PIAS INC BALTIMORE MD
(AROD 2603-17)
AD-612 531 DIV. 15

•DA36 039ORD3576RD
PENNSYLVANIA STATE UNIV UNIVERSITY
PARK DEPT OF ENGINEERING
MECHANICS
TR 3
AD-613 016 DIV. 25

•DA36 039AMC00034E
ELECTRICAL ENGINEERING RESEARCH
LAB CORNELL UNIV ITHACA
N Y
TR 82 EERL 28
AD-612 656 DIV. 8

•DA36 039AMC01464E
LANSDALE DIV PHILCO CORP
PA
AD-612 960 DIV. 6

•DA36 039AMC01473E
ASSEMBLY PRODUCTS INC CHESTERLAND
OHIO
AD-612 481 DIV. 7

•DA36 039AMC01476E
TUNG-SOL ELECTRIC INC BLOOMFIELD
N J
AD-612 658 DIV. 8

•DA36 039AMC01481E
BERYLLIUM CORP READING PA
AD-612 775 DIV. 8

•DA36 039AMC01483E
CRYSTALONICS INC CAMBRIDGE
MASS
AD-613 068 DIV. 8

•DA36 039AMC03200E
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
AD-612 529 DIV. 20
AD-613 112 DIV. 25
AD-613 113 DIV. 25

•DA36 039AMC03200E GRANT
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
AD-613 088 DIV. 16

•DA36 039AMC03617E
WESTINGHOUSE ELECTRIC CORP
ELKRIDGE MD
AD-612 756 DIV. 8

•DA36 039AMC03622E
GENERAL INSTRUMENT CORP DARLINGTON
S C CAPACITOR DIV
AD-612 876 DIV. 8

•DA36 039AMC03623E
MALLORY (P R) AND CO INDIANAPOLIS
IND
AD-612 647 DIV. 8

•DA36 039AMC03632E
TEXAS INSTRUMENTS INC DALLAS
03 64 73
AD-612 617 DIV. 8

•DA36 039AMC03636E
SYSTEMS INC ORLANDO FLA
AD-612 603 DIV. 8

•DA36 039AMC03703E
ELECTRICAL ENGINEERING RESEARCH
LAB UNIV OF ILLINOIS URBANA
AD-612 484 DIV. 2

•DA36 039SC85953
GENERAL ELECTRIC CO OWENSBORO
KY
F AD-612 641 DIV. 8

•DA36 039SC85988
KAYSAM CORP OF AMERICA PATERSON
N J
F AD-612 608 DIV. 2

•DA36 039SC86727E
GENERAL ELECTRIC CO SYRACUSE
N Y SEMICONDUCTOR PRODUCTS
DEPT
F AD-612 599 DIV. 8

•DA36 039SC86734
WESTON INSTRUMENTS INC NEWARK
N J
AD-613 029 DIV. 8

•DA36 039SC86741
AEROPROJECTS INC WEST CHESTER
PA
AD-612 600 DIV. 26

•DA36 039SC87222
BROWN UNIV PROVIDENCE R I
AD-612 470 DIV. 15

•DA44 009AMC4797T
GENERAL ELECTRIC CO WEST
LYNN MASS
AD-612 766 DIV. 7

•DA44 009AMC756T
PRATT AND WHITNEY AIRCRAFT
EAST HARTFORD CONN
PWA 2449
F AD-613 031 DIV. 7

•DA44 009ENG4909
GENERAL ELECTRIC CO WEST
LYNN MASS
AD-612 766 DIV. 7

•DA44 177TC819
SOUTHWEST RESEARCH INST SAN
ANTONIO TEX
(TRECOM TR-64-66)
F AD-613 077 DIV. 10

•DA49 007MD1004
MARYLAND UNIV COLLEGE PARK
AD-612 862 DIV. 28

•DA49 092AR028
SENSORY SYSTEMS LAB TUCSON
ARIZ
F AD-612 908 DIV. 16

•DA49 146XZ096
STANFORD RESEARCH INST MENLO
PARK CALIF
AD-612 491 DIV. 30

•DA49 146XZ204
LOCKHEED MISSILES AND SPACE
CO SUNNYVALE CALIF
3 24 64 1
(DASA 1480)
F AD-612 737 DIV. 2

•DA49 146XZ205
LOCKHEED MISSILES AND SPACE
CO PALO ALTO CALIF
AD-612 860 DIV. 2

•DA49 146XZ280
STANFORD RESEARCH INST MENLO
PARK CALIF
AD-612 491 DIV. 30

•DA49 193MD2357 GRANT
BAYLOR UNIV HOUSTON TEX COLL
OF MEDICINE
AD-612 525 DIV. 16

•DA49 193MD2379
JOHNS HOPKINS UNIV BALTIMORE
MD SCHOOL OF MEDICINE
AD-612 833 DIV. 16
AD-612 834 DIV. 16

•DA91 591EUC2891
TECHNISCHE HOCHSCHULE KARLSRUHE
(GERMANY) METEOROLOGISCHES
INSTITUT•
F AD-612 894 DIV. 2

•DRB9325 10
TORONTO UNIV (ONTARIO)
AD-613 108 DIV. 16

•FA WA4632
BERNARD ELECTRONICS CO WASHINGTON
D C
(SRDS RD-65-8)
F AD-613 027 DIV. 7

•FA WA4639
BEECH AIRCRAFT CORP WICHITA
KANS
(FAA-ADS 12)
AD-613 061 DIV. 1

•FAA BRD112
TRW COMPUTERS CO CANOGA PARK
CALIF
(PB 159 977)
F AD-612 898 DIV. 19

•GC17
HISTORICAL EVALUATION AND
RESEARCH ORGANIZATION WASHINGTON
D C•
AD-612 685 DIV. 32
AD-612 688 DIV. 32
AD-612 689 DIV. 32
AD-612 690 DIV. 32
AD-612 695 DIV. 32

•GP2495
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
AD-613 088 DIV. 16

•GRANT NASA NGR05 002 028
CALIFORNIA INST OF TECH PASADENA
AD-612 865 DIV. 2

•GRANT NSF GP2633
OPERATIONS RESEARCH CENTER
UNIV OF CALIF BERKELEY
ORC 64 30
AD-612 966 DIV. 15

•GRANT PHS AI05111
COLUMBIA UNIV NEW YORK COLL
OF PHYSICIANS AND SURGEONS
AD-612 980 DIV. 16

•GRANT PHS MI774
GROUP EFFECTIVENESS RESEARCH
LAB UNIV OF ILLINOIS URBANA
ONR TR 21

AD-612 936 DIV. 28

•NASA NGR05 002 028
CALIFORNIA INST OF TECH PASADENA
AD-612 523 DIV. 20
AD-612 842 DIV. 2

•NASW845
RIAS INC BALTIMORE MD
(AFOSR 65-0319)
AD-612 456 DIV. 15

•NAS9 3111
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF
AD-612 860 DIV. 2

•NBY32219
MOORE SCHOOL OF ELECTRICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA
65 07
AD-612 675 DIV. 30

•NBY53160
FRITZ ENGINEERING LAB LEHIGH UNIV BETHLEHEM PA
205A.36
AD-613 074 DIV. 13

•NIH GM0671 5
IOWA STATE UNIV IOWA CITY
AD-612 752 DIV. 16

•NIH MH04737 03
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-613 087 DIV. 32

•NOBSR64723
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF ILLINOIS URBANA
RRL 273
AD-613 039 DIV. 6

•NOBSR85320
GENERAL BRONZE CORP GARDEN CITY N Y
AD-613 064 DIV. 8

•NOBSR87522
BOTRON MFG CO WOODSTOCK N Y
AD-613 032 DIV. 26

•NOBSR89229
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF ILLINOIS URBANA
RRL 273
AD-613 039 DIV. 6

•NOBSR89530
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y
F AD-612 666 DIV. 8

•NOBSR89546
LITTON INDUSTRIES SAN CARLOS CALIF
AD-612 644 DIV. 8

•NOBSR91001
WESTINGHOUSE ELECTRIC CORP WASHINGTON D C
AD-612 496 DIV. 8

•NOBSR91300
HYLETRONICS CORP BURLINGTON MASS
AD-613 033 DIV. 8

•NOBS90041
FRITZ ENGINEERING LAB LEHIGH UNIV BETHLEHEM PA
205A.36
AD-613 074 DIV. 13

•NOBS90301
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF
SM 47833
AD-612 951 DIV. 14

•NONR G00063 64
WEBB INST OF NAVAL ARCHITECTURE GLEN COVE N Y
F AD-612 799 DIV. 9

•NONR-185809
PRINCETON UNIV N J
AD-612 916 DIV. 25

•NONR114111
CASE INST OF TECH CLEVELAND OHIO
AD-612 645 DIV. 26

•NONR122434
MICHIGAN UNIV ANN ARBOR
AD-613 115 DIV. 28

•NONR122435
MICHIGAN UNIV ANN ARBOR
AD-613 124 DIV. 16

•NONR122806
NORTHWESTERN UNIV EVANSTON ILL
TR 7
AD-613 126 DIV. 25

•NONR122810
CARNEGIE INST OF TECH PITTSBURGH PA GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION
MSRR 29
F AD-613 028 DIV. 32

•NONR128809
MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LAB UNIV OF UTAH SALT LAKE CITY
MDL 011
AD-612 954 DIV. 8

•NONR140604
ILLINOIS INST OF TECH CHICAGO
DOMIIT 1 27
AD-612 663 DIV. 13

•NONR157504
COATES CHEMICAL LABS LOUISIANA STATE UNIV BATON ROUGE
TR 55
AD-612 662 DIV. 4

•NONR158915
LITTON SYSTEMS INC MINNEAPOLIS MINN APPLIED SCIENCE DIV
AD-613 101 DIV. 26

•NONR167000
BELL HELICOPTER CO FORT WORTH TEX
D228 421 020
AD-612 465 DIV. 1

•NONR183413
NOYES CHEMICAL LAB UNIV OF ILLINOIS URBANA
TR 81
AD-612 486 DIV. 4

•NONR183436
GROUP EFFECTIVENESS RESEARCH LAB UNIV OF ILLINOIS URBANA
ONR TR 21
AD-612 936 DIV. 28

•NONR1841 12
MASSACHUSETTS INST OF TECH CAMBRIDGE
AD-613 142 DIV. 9

•NONR184123
MASSACHUSETTS INST OF TECH CAMBRIDGE
AD-612 625 DIV. 25

•NONR184168
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF NAVAL ARCHITECTURE AND MARINE
64 16
F AD-612 467 DIV. 31

•NONR184187
OPERATIONS RESEARCH CENTER MASS INST OF TECH CAMBRIDGE
TR 11
AD-612 601 DIV. 15

•NONR185816
PRINCETON UNIV N J
RM 73
AD-613 034 DIV. 15

•NONR186607
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
AD-612 736 DIV. 30

•NONR186614
MALLINCKRODT CHEMICAL LAB HARVARD UNIV CAMBRIDGE MASS
AD-612 475 DIV. 4

•NONR186616
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
AD-612 736 DIV. 30

•NONR186619
CYCLOTRON LAB HARVARD UNIV CAMBRIDGE MASS
AD-612 914 DIV. 20

•NONR186643 GRANT
HARVARD UNIV BOSTON MASS MEDICAL SCHOOL
TR 12
AD-613 041 DIV. 28

•NONR186648
HARVARD COLL CAMBRIDGE MASS OBSERVATORY
A AD-612 923 DIV. 30

•NONR186648 GRANT
HARVARD COLL CAMBRIDGE MASS OBSERVATORY
AD-612 574 DIV. 30

•NONR212120
INSTITUTE FOR THE STUDY OF METALS UNIV OF CHICAGO ILL
AD-613 097 DIV. 25
AD-613 098 DIV. 25

•NONR212120 GRANT
INSTITUTE FOR THE STUDY OF METALS UNIV OF CHICAGO ILL
AD-612 976 DIV. 9

•NONR22006
CALIFORNIA INST OF TECH PASADENA
AD-613 089 DIV. 25

•NONR22033
GATES AND CRELLIN LABS OF CHEMISTRY CALIF INST OF TECH PASADENA
AD-612 967 DIV. 25
AD-612 968 DIV. 25

•NONR22047
CALIFORNIA INST OF TECH PASADENA
AD-612 524 DIV. 20
AD-612 865 DIV. 2

•NONR22047 GRANT
CALIFORNIA INST OF TECH PASADENA
AD-612 523 DIV. 20
AD-612 842 DIV. 2

•NONR221600
CALIFORNIA UNIV LA JOLLA
AD-612 573 DIV. 4

•NONR221612
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
AD-612 824 DIV. 2

•NONR221620
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
AD-612 822 DIV. 2

•NONR221623
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
AD-612 825 DIV. 2
AD-612 826 DIV. 2
AD-613 114 DIV. 2

•NONR22283
OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY
ORC 64 30
AD-612 966 DIV. 15

•NONR225 19
STANFORD UNIV CALIF
AD-613 119 DIV. 25
AD-613 120 DIV. 20

•NONR225 37
COMPUTER SCIENCE DIV STANFORD UNIV CALIF
CS 19
(TT 65-61839)
AD-612 686 DIV. 32

•NONR225 75
STANFORD UNIV CALIF
AD-613 119 DIV. 25
AD-613 120 DIV. 20

•NONR22537
STANFORD UNIV CALIF SCHOOL OF HUMANITIES AND SCIENCES
CS 18
AD-612 478 DIV. 15

•NONR22567
HIGH ENERGY PHYSICS LAB STANFORD UNIV CALIF
HEPL 296
AD-612 836 DIV. 20
HEPL 330
AD-612 837 DIV. 20

•NONR22574
STANFORD UNIV CALIF
TR 4
AD-612 811 DIV. 9

•NONR22577
STANFORD UNIV CALIF DEPT OF INDUSTRIAL ENGINEERING
TR 2
AD-612 716 DIV. 15

•NONR229602
MISSOURI UNIV COLUMBIA
TR 14
AD-613 045 DIV. 28

•NONR22975
CALIFORNIA UNIV LOS ANGELES
WP 66
AD-612 729 DIV. 32
WP 67
AD-612 730 DIV. 32
WP 69
AD-612 731 DIV. 32

•NONR258400
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
AD-613 125 DIV. 2

•NONR265300
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
CAL AF 1285 A 12 (1)
AD-612 758 DIV. 9

•NONR26604
CORNELL UNIV ITHACA N Y
AD-612 852 DIV. 15

•NONR26640 GRANT
COLUMBIA UNIV NEW YORK COLL OF PHYSICIANS AND SURGEONS
AD-613 103 DIV. 16

•NONR26645
COLUMBIA RADIATION LAB NEW YORK
TR 18
AD-613 090 DIV. 20

•NONR26655 GRANT
COLUMBIA UNIV NEW YORK SCHOOL OF ENGINEERING AND APPLIED SCIENCE
AD-612 479 DIV. 15

•NONR26689
COLUMBIA UNIV NEW YORK COLL OF PHYSICIANS AND SURGEONS
AD-612 980 DIV. 16

•NONR26691
INSTITUTE FOR THE STUDY OF FATIGUE AND RELIABILITY COLUMBIA UNIV NEW YORK
TR 16
AD-612 712 DIV. 17
TR 15
AD-612 713 DIV. 25

•NONR268700
PENNSALT CHEMICALS CORP PHILADELPHIA PA
TR 44
AD-612 607 DIV. 4

•NONR277105
OREGON UNIV EUGENE
TR 5
AD-612 678 DIV. 25

•NONR28538
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
IMM NYU 338
AD-613 067 DIV. 15

•NONR28549
NEW YORK UNIV N Y
AD-613 127 DIV. 20

•NONR28549 GRANT
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
(AROD 2360:32)
AD-612 577 DIV. 25
NEW YORK UNIV N Y
AD-612 867 DIV. 25

•NONR28555
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
IMM NYU 328
AD-613 066 DIV. 15

•NONR308900
SOUTH DAKOTA STATE COLL BROOKINGS
AD-612 841 DIV. 16

•NONR311600
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH
D1 82 0398
AD-612 771 DIV. 2

•NONR331000 GRANT
VARIETY CHILDREN'S RESEARCH FOUNDATION MIAMI FLA
AD-613 136 DIV. 16

•NONR335701
POLYMER RESEARCH INST UNIV OF MASSACHUSETTS AMHERST
TR 66
AD-612 488 DIV. 14
TR 77
AD-612 489 DIV. 30

•NONR339012
RAVEN INDUSTRIES INC SIOUX FALLS S DAK
2965
AD-612 938 DIV. 2

•NONR359101
BUCKNELL UNIV LEWISBURG PA
TR 15
AD-612 952 DIV. 28
TR 14
AD-612 953 DIV. 28

•NONR360800
NATIONAL RESEARCH CORP CAMBRIDGE MASS
AD-612 928 DIV. 25

•NONR365606 GRANT
CALIFORNIA UNIV BERKELEY
AD-613 100 DIV. 32

•NONR365612 GRANT
CALIFORNIA UNIV SAN FRANCISCO MEDICAL CENTER
AD-612 582 DIV. 16

•NONR368800
HYDRONAUTICS INC LAUREL MD
TR 231 4
AD-612 482 DIV. 9

•NONR370400
SOUTHWEST RESEARCH INST SAN ANTONIO TEX
F AD-612 872 DIV. 30

•NONR372001
INSTITUTE FOR BEHAVIORAL RESEARCH UNIV OF MARYLAND COLLEGE PARK
TR 6
AD-612 649 DIV. 28

•NONR373100
MECHANICAL TECHNOLOGY INC LATHAM N Y
MTI 65TR6
S AD-612 899 DIV. 27

•NONR381000
TEXAS INSTRUMENTS INC DALLAS
AD-612 934 DIV. 14

•NONR381900X
AMPEX CORP REDWOOD CITY, CALIF
RR 65 1
AD-612 720 DIV. 26

•NONR383300
CORNING GLASS WORKS N Y
AD-612 964 DIV. 25

•NONR383400
EASTMAN KODAK CO ROCHESTER N Y
F AD-612 459 DIV. 25

•NONR39305
HIGH ALTITUDE OBSERVATORY BOULDER COLO
AD-612 972 DIV. 2

•NONR394200
GENERAL ELECTRIC CO SCHENECTADY N Y
AD-612 835 DIV. 8

•NONR39604
NARRAGANSETT MARINE LAB UNIV OF RHODE ISLAND KINGSTON
TR 12
F AD-612 458 DIV. 25

•NONR39612
RHODE ISLAND UNIV KINGSTON
TR 6
AD-612 714 DIV. 8

•NONR4008 07
MIAMI UNIV CORAL GABLES FLA
SR 3
AD-613 093 DIV. 4

•NONR401900
STAUFFER CHEMICAL CO RICHMOND CALIF
AD-612 661 DIV. 10

•NONR404Ø8
RUTGERS -THE STATE UNIV NEW BRUNSWICK N J
AD-612 630 DIV. 4

•NONR404Ø9
RUTGERS -THE STATE UNIV NEW BRUNSWICK N J
AD-612 827 DIV. 28

•NONR4Ø6ØØ GRANT
IOWA STATE UNIV IOWA CITY
AD-612 752 DIV. 16

•NONR4Ø96ØØ
SCHJELDAHL (G I) CO NORTHFIELD MINN
AD-612 598 DIV. 1

•NONR41Ø2Ø1
MASSACHUSETTS INST OF TECH CAMBRIDGE
MAC TR 16
AD-612 702 DIV. 30

•NONR413ØØ
GENERAL ELECTRIC CO SYRACUSE N Y
AD-612 932 DIV. 25

•NONR418ØØ
TEXTILE RESEARCH INST PRINCETON N J
TR 5
AD-612 728 DIV. 14

•NONR418Ø1
TEXTILE RESEARCH INST PRINCETON N J
TR 5
AD-612 729 DIV. 14

•NONR419ØØ
DON BOSCO INST FOR RESEARCH RAMSEY N J
DBIR 105
AD-612 539 DIV. 25

•NONR421ØØX
STANFORD RESEARCH INST MENLO PARK CALIF
F AD-613 009 DIV. 14

•NONR421ØØ
MITSUBISHI HEAVY INDUSTRIES LTD NAGASAKI (JAPAN)
R 1800
F AD-612 877 DIV. 9

•NONR425Ø1Ø
COLUMBIA RADIATION LAB NEW YORK
TR 1
AD-613 091 DIV. 8

•NONR438ØØ
SPACE GENERAL CORP EL MONTE CALIF
TR 6
AD-612 605 DIV. 4

•NONR446ØØØ
ASPEN INST FOR HUMANISTIC STUDIES COLO
AD-613 057 DIV. 25

•NONR451ØØ
MONSANTO RESEARCH CORP EVERETT MASS
MRB3ØØ9Ø3
AD-613 Ø13 DIV. 4

•NONR457200
PERKIN-ELMER CORP NORWALK CONN ELECTRO-OPTICAL DIV
PE TR 7863
AD-613 063 DIV. 25

PE TR 7946
AD-613 080 DIV. 25

•NONR467200
BERKELEY INST OF PSYCHOLOGICAL RESEARCH SAN FRANCISCO CALIF
TR 1
AD-613 098 DIV. 28

•NONR49516
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
809 15
F AD-612 925 DIV. 25

•NONR55136
PENNSYLVANIA UNIV PHILADELPHIA
TR 22
AD-612 472 DIV. 25
TR 21
AD-612 473 DIV. 25

•NONR56236
BROWN UNIV PROVIDENCE R I DIV OF APPLIED MATHEMATICS
AD-612 476 DIV. 15
AD-612 684 DIV. 15

•NONR59510
MARYLAND UNIV COLLEGE PARK
AD-612 615 DIV. 25

•NONR59517
INSTITUTE FOR FLUID DYNAMICS AND APPLIED MATHEMATICS UNIV OF MARYLAND COLLEGE
BN 391
AD-612 648 DIV. 15

•NONR60947
YALE UNIV NEW HAVEN CONN
AD-612 606 DIV. 9

•NONR65620
MATERIALS RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK
TR 19
AD-612 540 DIV. 25

•NONR65623
PENNSYLVANIA STATE UNIV UNIVERSITY PARK
AD-612 829 DIV. 30
AD-612 831 DIV. 25

•NONR66811
ROCHESTER UNIV N Y SCHOOL OF MEDICINE AND DENTISTRY
AD-612 840 DIV. 16

•NONR66909
SYRACUSE UNIV N Y RESEARCH INST
AD-612 627 DIV. 25

•NONR71027
INSTITUTE OF TECH UNIV OF MINNESOTA MINNEAPOLIS
TR 6
AD-612 828 DIV. 25

•NONR76024
CARNEGIE INST OF TECH PITTSBURGH PA GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION
MSRR 34
F AD-612 779 DIV. 15
MSRR 29
F AD-613 028 DIV. 32
MSRR 35
F AD-613 078 DIV. 8

•NONR83917FBM
POLYTECHNIC INST OF BROOKLYN N Y
PIBAL 699
AD-612 778 DIV. 25

•NORD 7386
APPLIED PHYSICS LAB JOHNS HOPKINS UNIV SILVER SPRING MD
(NAVWEPS 1488 V3)
AD-613 056 DIV. 9
(NAVWEPS 1488 V5)
AD-613 059 DIV. 9

•NOW61 0893C
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y
F AD-612 727 DIV. 30

•NOW62 0604C
APPLIED PHYSICS LAB JOHNS HOPKINS UNIV SILVER SPRING MD
TG 619
AD-612 920 DIV. 30
(NAVWEPS 1488 V6)
AD-613 055 DIV. 9

•NOW63 0573D
AEROPHYSICS LAB MASS INST OF TECH CAMBRIDGE
TR 100
AD-613 026 DIV. 9

•NOW64 0040D
RUTGERS -THE STATE UNIV NEW BRUNSWICK N J SCHOOL OF CERAMICS
F AD-612 959 DIV. 14

•NOW64 0070D
CALIFORNIA UNIV BERKELEY METAL PROCESSING LAB
F AD-612 913 DIV. 26

•NOW64 0294J
WESTINGHOUSE ELECTRIC CORP PITTSBURGH PA
F AD-612 980 DIV. 26
AD-613 025 DIV. 26

•NOW64 0393C
ATLANTIC RESEARCH CORP ALEXANDRIA VA
AD-612 657 DIV. 27

•NSF GB4
ILLINOIS UNIV URBANA
AD-612 578 DIV. 16

•NSF GP2202
COLUMBIA UNIV NEW YORK SCHOOL OF ENGINEERING AND APPLIED SCIENCE
AD-612 479 DIV. 15

•NSF GP579
PRINCETON UNIV N J (AROD 3083:13)
AD-613 110 DIV. 25

•NSF G16526
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-613 087 DIV. 32

•NSF G23068
INSTITUTE FOR THE STUDY OF METALS UNIV OF CHICAGO ILL
AD-612 976 DIV. 9

•NSG275 62
THEORETICAL CHEMISTRY INST UNIV OF WISCONSIN MADISON
AD-613 157 DIV. 25

•NSG438
HARVARD COLL CAMBRIDGE MASS OBSERVATORY
AD-612 574 DIV. 30

•NSG5 59
INSTITUTE FOR MOLECULAR PHYSICS UNIV OF MARYLAND COLLEGE PARK
AD-613 150 DIV. 4

•NSG87 60
ASTROPHYSICAL OBSERVATORY SMITHSONIAN INSTITUTION

CAMBRIDGE MASS
AD-612 861 DIV. 2

•N600 19 59930
SOUTHERN RESEARCH INST BIRMINGHAM ALA
7221 1979 IX
AD-612 759 DIV. 17

•N600 61533 62758
MINNESOTA MINING AND MFG CO ST PAUL
AD-612 602 DIV. 7

•N62958 2453
OXFORD UNIV (ENGLAND)
AD-612 563 DIV. 16
AD-612 564 DIV. 28
AD-612 748 DIV. 28

•N62958 2834
SCOTTISH MARINE BIOLOGICAL ASSOCIATION EDINBURGH
AD-612 533 DIV. 16
AD-612 869 DIV. 16

•N62958 3127
INTERNATIONAL RESEARCH AND DEVELOPMENT CO LTD NEWCASTLE (ENGLAND)
IRD 64 59
F AD-612 901 DIV. 7

•N62958 3315
TECHNION -ISRAEL INST OF TECH HAIFA
F AD-612 772 DIV. 15

•N62958 3634
QUEEN'S UNIV BELFAST (NORTHERN IRELAND)
AD-612 749 DIV. 25
AD-612 924 DIV. 25
AD-612 969 DIV. 25
AD-612 970 DIV. 25
AD-612 971 DIV. 25
AD-612 973 DIV. 25

•N62958 3841
LABORATOIRE D'INFRA ROUGE TECHNIQUE ET APPLIQUE GIF-SUR-YVETTE (FRANCE)
AD-612 567 DIV. 25

•N62958 4180
INTERNATIONAL RESEARCH AND DEVELOPMENT CO LTD NEWCASTLE (ENGLAND)
IRD 64 59
F AD-612 901 DIV. 7

•OCD-OS-62-134
INSTITUTE FOR DEFENSE ANALYSES ARLINGTON VA ECONOMIC AND POLITICAL STUDIES DIV
STUDY S 184
AD-612 706 DIV. 18

•PHS AI01763
COLUMBIA UNIV NEW YORK COLL OF PHYSICIANS AND SURGEONS
AD-613 103 DIV. 16

•PHS AP00002 05
CALIFORNIA UNIV BERKELEY
AD-613 100 DIV. 32

•PHS GM03869
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index

1. Aircraft and Flight Equipment

Patent 3,170,324 Div. 1, 2

AERODYNAMIC MEASURING DEVICE.
Patent assigned to NASA,
by Virgil S. Ritchie and Howard F. Ogden.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Barometric pressure, Pressure gages), (*Pressure gages, Barometric pressure), (*Pitot tubes, Airborne), Statics, Gas flow, Angle of attack, Patents.

The cylindrical probe includes a base portion affixed to an aircraft, or the like, and a leading portion extending axially from and rotatably mounted on the base portion, wherein the leading portion includes an aerodynamic surface affixed thereto on a peripheral portion thereof, and orifices formed in the periphery thereof at points equidistantly radially spaced from such surface by a sufficient distance to be maintained in a region where static pressure exists.

Patent 3,170,438 Div. 1, 4

DEVICE FOR PROLONGED WATER MARKING.
Patent assigned to Navy,
by Coleman Nadler and Harry T. Haefelin. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Markers, Air-sea rescues), (*Air-sea rescues, Markers), Dyes, Safety devices, Survival, Water, Diffusion, Solubility, Polyvinyl alcohol, Alcohols, Patents.

The dye marker device is for air-sea survival usage. The device consists of a plurality of cakes containing polyvinyl alcohol, a water soluble dye, glycerine and borax, a packet for supporting the cakes in the water and elements in the form of screens for positioning the cakes. The dye is released by a diffusion process.

Patent 3,170,978 Div. 1, 8, 19

APPARATUS FOR DISPLAYING RELATIVELY DISPLACEABLE SUPERPOSED SIMULATIVE PATTERNS.
Patent assigned to Navy,
by George H. Balding. 23 Feb 65 Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Television display systems, Flight paths), (*Flight paths, Television display systems), Flight simulators, Patents.

A display is provided on a television type screen of a pattern simulative of actual direction of flight of an aircraft super-imposed on a pattern simulative of the ground, sky and horizon relative to the aircraft wherein the pattern simulative of the actual ground and horizon may be displaced in response to aircraft roll while the pattern simulative of direction of flight of the aircraft remains stationary on the screen.

2. Astronomy, Geophysics and Geography

N65-14530 Div. 2, 12
CFSTI Prices: HC$2.00 MF$0.50

Republic Aviation Corp., Farmingdale, N. Y.
APPLICATION OF VARIATION OF PARAMETERS TO THE POLAR OBLATENESS PROBLEM.
Semiannual rept. no. 4, pt 1.
19 Feb 64, 21p RAC-720-7, RD-TR-64-3-2
Contract NAS8 2605
Unclassified report

Research Regarding Guidance and Space Flight Theory Relative to the Rendezvous Problem.

Descriptors: (*Calculus of variations, Celestial mechanics), (*Perturbation theory, Celestial guidance), Space flight.

PB-166 822 Div. 2
CFSTI Prices: HC$4.00 MF$1.00

Queen Mary Coll., Univ. of London (England).
A THEORETICAL DISCUSSION OF DIFFUSION AND DRIFT IN THE F2 REGION.
Final rept.,
by V. C. A. Ferraro. 30 Nov 61, 149p
Contract AF61 052 299
AFCRL 62-623; AD 276 931
Unclassified report

Descriptors: (*Ionosphere, Mathematical models), (*Drift, Ionosphere), (*Diffusion, Ionosphere), Green's function, Ionization, Electrons, Electron density, Solar radiation, Solar eclipses, Diurnal variations, Great Britain.

This investigation presents a mathematical model of the F2 region in which ionization is produced by solar electromagnetic radiation and electrons and ions disappear by attachment-like processes. The control of the ionization is attributed to diffusion and, in special cases, to uniform vertical drift. The time-dependent diffusion-drift equation is solved to obtain the electron density N as a function of both height and time with a time-period of 24 hours. The investigation was primarily undertaken to verify the hypothesis put forward by Bradbury that the F1 and F2 regions are both due to the same ionizing agency and that the formation of these two distinct layers is due to the different conditions - mainly the processes by which ionization disappears - obtaining in these two regions. Assuming that electrons disappear by a linear law,

we have been able to verify the correctness of Bradbury's hypothesis and find, that in the higher levels of the F2 region the ionization is controlled by ambipolar diffusion, through the actual electron density is dependent on the relative magnitudes of the parameters characterizing the attachment-like loss coefficient and diffusion coefficient. It is also shown that there is a certain geomagnetic control on the distribution of ionization. (Author)

PB-166 848 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Stanford Electronics Labs., Stanford Univ., Calif.
A COOPERATIVE REPORT ON THE CORRELATION BETWEEN AURORAL, MAGNETIC, AND ELF PHENOMENA AT BYRD STATION, ANTARCTICA,
by Ward J. Helms and John P. Turtle. Aug 64, 42p
Technical rept. no. TR-3408-2, SEL-64-043
Grant NSF-G17217, Grant NSF-G17627

Unclassified report

Descriptors: (*Aurorae, Atmospherics), (*Magnetic storms, Atmospherics), (*Atmospherics, Polar regions), Extremely low frequency, Very low frequency, Electromagnetic waves, Geophysics, Correlation techniques, Instrumentation, Meteorology.

During the austral winter of 1962 several independent data systems were used to continuously monitor the electromagnetic spectrum from 0.05 cps through 20 kc. Quantitative amplitude vs frequency records of the upper ELF and VLF bands are shown. Synoptic auroral data were obtained. Some regular slow-speed magnetograph data are also shown. The geophysical events recorded are seen to fall into two broad categories: the impulsive events near magnetic midnight and the regular events near magnetic noon. Detailed relationships between phenomena during typical events of both types are shown. The magnetic-midnight events are seen to be very large amplitude, short-lived disturbances characterized by correlated auroral flare-ups, VLF hiss burst, and rapid magnetic-field variations. The magnetic-noon disturbances are of lesser intensity and longer duration, and are characterized by VLF chorus and regular-type magnetic micropulsations. No correlation between these phenomena is evident except for agreement between minute intensity pulsations in the aurora and magnetic micropulsations in the period preceding magnetic noon. No correlation was found between ELF signals and other geophysical events at any time of day. (Author)

PB-166 852 Div. 2, 24
CFSTI Prices: HC$3.00 MF$0.75

Ohio State Univ. Research Foundation, Columbus.
THE USE OF PHOTOGRAMMETRIC METHODS TO INVESTIGATE SURFACE MOVEMENT OF THE ANTARCTIC ICE SHEET.
Final rept. for 31 May 63-1 Sep 64,
by Simha Weissman. Sep 64, 69p
Grant NSF G23006, Proj. RF1444

Unclassified report

Descriptors: (*Photogrammetry, Polar regions), (*Ice islands, Position finding), Geodesics, Aerial photography.

This report represents a part of a study being made to measure the surface movement of the Antarctic ice sheet using photogrammetric methods. The area under investigation is between Byrd Station and Mt. Chapman. Markers were placed in this area along a distance of 365 km and their positions were determined by aerial triangulation. One hundred twenty eight models were bridged and the coordinates obtained will be compared with future observations in order to determine the rate of movement of the ice sheet. This report evaluates the work accomplished in the field, explains the performance of the aerial triangulation, analyzes the accuracy obtained and suggests a proposal for future work in view of the experience gained. (Author)

PB-166 854 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
SOLAR RADIO FLUX DURING THE IQSY AT UNIVERSITY PARK, PA., JULY-AUGUST-SEPTEMBER, 1964,
by J. P. Hagen. 10 Feb 65, 21p
Scientific rept. no. 234(D)
Grant NSF GP2986

Unclassified report

Descriptors: (*Radio astronomy, Sun), (*Extraterrestrial radio waves, Sun), (*Sun, Radio waves), Astrophysics, X band, Microwave frequency, Superhigh frequency, Ultrahigh frequency, Intensity, Measurement, Radio equipment, Universities, Pennsylvania, Data, Tables, Geophysics.

This report contains solar radio flux density data for July, August, and September, 1964. The July data was taken at 3035 mc/s. The August and September data was taken at 9300 mc/s and 960 mc/s as well as at 3035 mc/s. A description of the receivers used at 9300 mc/s, 3035 mc/s, and 960 mc/s is given. During the period July through September 1964 no significant solar radio activity was observed. (Author)

PB-166 857 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
ANTARCTIC RESEARCH AND DATA ANALYSIS.
GROSS EFFECT OF ELECTRON PRECIPITATION EVENTS ON MAGNETIC BAY DISTURBANCES,
by Gerald F. Rourke. 18 Dec 64, 36p
Technical rept. no. RAD-TR-64-41, Scientific rept. no. SR-18
Grant NSF C255

Unclassified report

Descriptors: (*Terrestrial magnetism, Electron density), (*Electron density, Terrestrial magnetism), Geophysics, Polar regions, Ionization, Electrons, Production.

From observations of the normal speed magnetograms, several examples of worldwide changes in the horizontal component are selected. These changes are of the order of 20 to 30 minutes duration. At high latitudes, the worldwide changes are followed by magnetic bays at College and Macquarie Island. Previous workers have suggested that the nonconservation of the third adiabatic invariant may be a cause for the loss of trapped electrons in the upper atmosphere. Assuming this to be so, electron production rates are determined for an isotropic distribution of electrons in the energy interval 40 < or = E < or = 160 Kev and a power law spectrum for the ambient electron flux with gamma = 3, 5, and 7. The additional ionization caused by the precipitated electrons is integrated over the altitude range from 90 to 130 km to ascertain its contribution to the dc conductivity of an auroral zone current sheet. Changes in conductivity are related to the magnitude of magnetic field disturbances through the

parameter of electron flux intensity. The results indicate in part that a 160 kev electron at 7 r sub e mirroring at phi sub m = 65 degrees has an azimuthal drift period of 30 minutes. For worldwide magnetic field changes occurring in less than 30 minutes and with an ambient flux J (> or = 40 Kev) of 10 pi x 1000 particles (sq cm sec)/1 for gamma = 5, a bay disturbance of the order of 500 gammas would result. (Author)

PB-166 858 Div. 2, 8
CFSTI Prices: HC$3.00 MF$0.75

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
A MATHEMATICAL TECHNIQUE FOR THE CONVERSION OF WAVE INTERACTION DATA TO ELECTRON DENSITY PROFILES,
by F. V. Hellrich. 20 Sep 64, 80p
Scientific rept. no. SR-220
Grant NSF GP846

Unclassified report

Descriptors: (*Atmospheric sounding, Electron density), (*Electron density, Ionosphere), (*Wave transmission, Electron density), (*Numerical methods and procedures, Atmospheric sounding), Radio waves, Amplitude modulation, Phase modulation, Electrons, Temperatures, Correlation techniques, Iterative methods, Least squares method, Mapping (Transformations).

In this report, three methods for the conversion of amplitude and phase interaction data to electron density profiles are developed. Each method, using an iterative least square error technique, synthesizes electron density profiles of one of the three functional forms; the exponential, the quadratic, and the piece-wise linear. All of the methods are evaluated with respect to the errors that may be produced in the synthesized profile arising from uncertain values of collision frequency, disturbing pulse power, energy loss coefficient, and coefficients of interaction. Also a demonstration of the effectiveness of the combined use of amplitude and phase interaction in producing a more accurate profile than could be obtained with amplitude data alone is presented. The piece-wise linear method is found to be the most suitable for the reduction of actual interaction data, and its ability to synthesize electron density profiles with valleys is established. (Author)

PB-166 876 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Geophysical and Polar Research Center, Univ. of Wisconsin, Madison.
RESULTS OF GEOPHYSICAL STUDIES ON THE MCMURDO TO SOUTH POLE TRAVERSE,
by Edwin S. Robinson. Nov 62, 53p
Research rept. series no. RR-62-6

Unclassified report

Descriptors: (*Geophysical prospecting, Polar regions), Barometric pressure, Height finding, Seismology, Gravity, Terrestrial magnetism, Graphics, Tables.

Fourteen major stations and 267 minor stations were made. The following are scientific studies included in this report: (1) barometric altimetry at all stations; (2) Seismic reflection and refraction recordings at major stations; (3) gravimetric observations at all stations; and (4) Magnetic observations at all stations. The methods and results of data reduction and a brief discussion of the results are presented. The glaciological and meteorological studies are not included in this report.

PB-166 888 Div. 2, 30
CFSTI Prices: HC$1.00 MF$0.50

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept.,
by Glyndon L. Lynde. Jan 65, 6p
Contract Cwb10704

Unclassified report

See also PB-166 617.

Descriptors: (*Weather forecasting, Data processing systems), (*Data processing systems, Weather forecasting), Programming(Computers), Charts, Wind, Mathematical prediction.

Contents (status of projects and programs):
Aviation research implementation project
Comparative test of analysis techniques
Programming for Burroughs Digifax project
Upper-air-chart plotting program
Weather-depiction-chart production program
Surface-chart plotting program

PB-166 889 Div. 2, 12
CFSTI Prices: HC$2.00 MF$0.50

Chicago Univ., Ill. Mesometeorology Proj.
OUTLINE OF A THEORY AND EXAMPLES FOR PRECISE ANALYSIS OF SATELLITE RADIATION DATA,
by Tetsuya Fujita. Feb 63, 40p
Research Paper no. RP-15
Grants NsG333, Cwb WBG6

Unclassified report

Rept. on Mesometeorology Proj.

Descriptors: (*Photogrammetry, Meteorological satellites), (*Meteorological satellites, Photogrammetry), (*Thermal radiation, Earth), Projective geometry, Geodesics, Maps, Solar radiation, Infrared scanning, Radiometers, Data, Tables, Graphics, Meteorology.

Meteorological satellites, TIROS II, III, and IV, obtained a large amount of radiation data with their medium resolution scanning radiometers. These data have been or are being processed into three forms called (1) Grid Print Radiation Map, (2) FMRT Listing, and (3) FMR Tape, and are now available to researchers. In order to carry out researches on either meteorological or physical interpretation of these radiation data, it was necessary to determine the basic values, (1) the zenith angle and azimuth of the satellite viewed from the scan points on the earth, (2) the areas of scan points on the earth, and (3) the zenith angle and azimuth of the sun viewed from the scan points on the earth. The author developed a method of determining these basic values through graphical procedures. The charts, grids, and overlays required for the analysis are listed.

PB-166 894 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

National Hurricane Research Project, Weather Bureau, Washington, D. C.
ON THE STRUCTURE OF HURRICANE HELENE (1958),
by Jose A. Colon. Dec 64, 61p
Rept. no. R-72

Unclassified report

Descriptors: (*Tropical cyclones, Meteorological

parameters), (*Hurricane tracking, Air mass analysis), (*Marine meteorology, Tropical cyclones), (*Air mass analysis, Tropical cyclones), Vortices, Weather forecasting, Aircraft, Meteorological radar, Meteorological charts.

An investigation into the core of hurricane Helene was carried out by the U. S. Weather Bureau research aircraft from September 24 to 26, 1958. A discussion of the structure of this hurricane is presented. The major part of the data collected inside the circulation is illustrated in the form of radial profiles and selected horizontal charts. These data give an excellent view of the properties of a mature hurricane and of the changes that accompanied the process of intensification. Initially, hurricane Helene was a well defined vortex circulation, but with a highly disorganized velocity distribution and a rather large eye. With time, in a period of 48 hours, the system intensified considerably. The central pressure was reduced by about 60 mb. The circulation evolved into a much better organized vortex, with a smaller eye, an extremely warm core of air confined to the center, large thermal gradients across the eye wall, and a more typical wind distribution around it. All these features are illustrated and discussed in this report. (Author)

PB-166 895 Div. 2
CFSTI Prices: HC$4.00 MF$0.75

Geophysical and Polar Research Center, Univ. of Wisconsin, Madison.
A GRAVITY AND MAGNETIC SURVEY OF THE ROSS ICE SHELF AREA, ANTARCTICA,
by Hugh F. Bennett. Apr 64, 104p
Research rept. series no. RR-64-3
Unclassified report

Descriptors: (*Gravity, Polar regions), (*Terrestrial magnetism, Polar regions), (*Geophysics, Polar regions), Ice islands, Structural geology, Geological survey.

The three layered velocity section measured at Little America Station (LAS) by Crary (1961) is considered to be representative of the Ross Ice Shelf area. This assumption is supported by the fact that the Bouguer anomaly at LAS and the mean Bouguer anomaly over the ice shelf are similar. The section consists of top, middle, and bottom layers with velocities of 2.4 km/sec, 4.24 km/sec, and 6.38 km/sec and probable densities of 2.0 gm/cc, 2.7 gm/cc, and 3.0 gm/cc respectively. The upper layer consists, in part, of glacial till and may be mostly morainal. The bottom layer is tentatively associated with gabbro. Thick sections of the low density layer are indicated in the central portion of the ice shelf by the lower Bouguer anomalies there. An increase in thickness and elevation of the middle layer is suggested in the northwest portion of the ice shelf by gravity and magnetic anomalies. The upper 'magnetic horizon' appears to be associated with the bottom or 6.38 km/sec layer which lies at a depth of 2.6 km at LAS. The negative mean free air anomaly over the Ross Ice Shelf area is interpreted to be the result of former ice loading.

PB-166 897 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.
A DETAILED ANALYSIS OF CLEAR-AIR TURBULENCE OVER UTAH ON APRIL 10-11, 1963,
by D. R. McConathy, Jr. 1 Jan 65, 34p
Scientific rept. no. SR-1
Contract Cwb10393 Unclassified report

Descriptors: (*Turbulence, Atmospheric motion), (*Atmospheric motion, Turbulence), Atmospheric sounding Aircraft, Radiosondes, Meteorological parameters, Air mass analysis, Utah, Graphics, Tables.

Previous studies have related areas of Clear-Air Turbulence to regions of sloping baroclinic or adiabatic layers with low Richardson numbers. With the aid of detailed aircraft measurements and radiosonde soundings, an analysis of a strongly baroclinic region is made. Although some of the usual problems of uncertainty in data and analysis arise, the results agree well with previous theory. In one region of intense thermal gradient the agreement between geostrophic and actual wind fields is poor, thereby excluding the use of the thermal wind equation in obtaining realistic information. Values of the Richardson number and ICE index are analyzed over a cross section grid with the aid of a computer, and the results show low values of Ri and high values of ICE in regions of turbulence. The observations are consistent with the hypothesis that the critical Richardson number lies within the range 0.25 - 0.50, although they are not sufficient in density or accuracy to establish this range definitely. (Author)

PB-166 898 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Geophysical and Polar Research Center, Univ. of Wisconsin, Madison.
SOME ASPECTS OF SUBGLACIAL GEOLOGY AND GLACIAL MECHANICS BETWEEN THE SOUTH POLE AND THE HORLICK MOUNTAINS,
by Edwin S. Robinson. Jul 64, 94p
Research rept. series no. RR-64-7
Unclassified report

Descriptors: (*Glaciers, Polar regions), (*Geological survey, Polar regions), Geophysics, Gravity, Isostatic change, Terrestrial magnetism, Snow, Meteorology, Seismology, Tables.

Various aspects of subglacial geology, and glacial mechanics and regime were studied in the area between the South Pole and the Horlick Mountains. Scientific observations were made by the South Pole Traverse party during December, 1962 and January, 1963. The following programs were included: (1) barometric altimetry; (2) seismic reflection and refraction shooting; (3) gravity measurements; (4) magnetic measurements; (5) snow accumulation; near surface density and temperature measurements; (6) surface meteorological observations. Data reduction and results of the geophysical surveys are described. Interpretation of these results is also given.

PB-166 899 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Geophysical and Polar Research Center, Univ. of Wisconsin, Madison.
AEROMAGNETIC RECONNAISSANCE OF ANTARCTICA BETWEEN BYRD AND WILKES STATIONS,
by Ned A. Ostenso and Edward C. Thiel. Jul 64, 35p
Research rept. series no. RR-64-6
Unclassified report

Descriptors: (*Terrestrial magnetism, Polar regions), Airborne, Magnetometers, Airplanes, Flight paths, Geophysics, Data, Tables, Maps.

During the three austral field seasons from 1958 to 1961, 13,000 km of airborne magnetics were flown in the sector of Antarctica between the 85th West meridian and Wilkes Station. This survey, consisting of 12 flights, was flown

in Navy aircraft instrumented with a Varian nuclear precession magnetometer which recorded the absolute value of the earth's total field (F). The regional magnetic field was removed from the observed aeromagnetic profiles by use of stiff splines so that a smooth line, giving the best overall fit to the observed data, could be drawn through a profile. The resulting residual magnetic profiles along the various flight lines are shown.

3. Chemical Warfare Equipment and Materials

No Entries

4. Chemistry

N65-16585 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics, and Space Administration, Cleveland, Ohio.
MASS SPECTROMETRIC INVESTIGATION OF REACTIONS OF OXYGEN ATOMS WITH HYDROGEN AND AMMONIA,
by Edgar L. Wong and Andrew E. Potter, Jr.
Feb 65, 28p NASA-TN-D-2648
Unclassified report

Descriptors: (*Oxygen, Chemical reactions), (*Spectroscopy, Chemical reactions).

Patent 3,166,595 Div. 4, 10, 22

N,N-DIFLUOROALKYLAMINES.
Patent assigned to AEC,
by Jack W. Frazer. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Amines, Synthesis (Chemistry)), (*Fluorine compounds, Amines), (*Explosive materials, Fluorine compounds), (*Rocket propellants, Fluorine compounds), Hydrazine derivatives, Photochemistry, Ultraviolet radiation, Patents.

The nitrogen-fluorine compounds have utility as explosives and rocket fuels. The method involves the reaction of alkyl halides with tetrafluorohydrazines in the presence of ultraviolet radiation to form N,N-difluoroalkylamines, specifically N,N-difluoromethylamine and N,N-difluoroethylamine.

Patent 3,166,834 Div. 4, 13

CATALYST BED REMOVING TOOL.
Patent assigned to NASA,
by James B. Newman. 26 Jan 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Steam power plants, Hydrogen peroxide), (*Hydrogen peroxide, Decomposition), Catalysts, Nets, Silver, Disposal, Patents.

The tool may be used in the removal without damage of catalyst bed elements used in power units generating steam by the chemical decomposition of hydrogen peroxide. The tool is in the form of a collet having an elongated threaded shank together with a cylindrical member disposed about the shank. An alignment spacer fits the outer end of the cylinder, and a knurled knob is threaded onto the end of the shank, so that upon turning of this knob the cylinder is forced axially of the collet toward the open end thereof.

Patent 3,170,765 Div. 4, 10, 14

SUSPENDED WATER DETERMINATION.
Patent assigned to Navy,
by William H. Huebl, Paul Schatzberg, and Nathan Glassman. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Aviation fuels, Chemical analysis), (*Water, Quantitative analysis), Jet engine fuels, Hydraulic fluids, Organic compounds, Sodium compounds, Potassium compounds, Bicarbonates, Carboxylic acids, Citrates, Liquids, Powders, Chemical reactions, Patents.

The method is for determining the amount of water suspended in an organic liquid such as aircraft fuel or hydraulic fluids. The liquid is contacted with a mixture of water soluble powders which form a gas when they react with water. The gas pressure is measured to indicate the presence of water. Sodium or potassium bicarbonate and citric acid are used.

Patent 3,170,785 Div. 4, 26

REMOVAL OF ADSORBED HYDROGEN FROM PYROPHORICALLY PARTICULATE MATERIALS.
Patent assigned to AEC,
by Lawrence R. Phillips. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Pyrophoric materials, Dehydrogenation), (*Dehydrogenation, Pyrophoric materials), (*Tungsten, Dehydrogenation), Particles, Vacuum apparatus, Uranium compounds, Dioxides, Molybdenum, Iron, Nickel, Rhenium, Patents, Powder metallurgy.

Adsorbed hydrogen is removed from the outer periphery of pyrophoricly particulate tungsten produced by hydrogen reduction of oxidic tungsten powders. The material is subjected to a vacuum treatment at a pressure less than about 10 microns for a period sufficient to remove adsorbed hydrogen from the outer periphery to prevent them from being pyrophoric in air at about room temperature.

5. Communications

Patent 3,165,588 Div. 5

TUNE DIVISION MULTIPLEX DIGITAL COMMUNICATION SYSTEM EMPLOYING DELTA MODULATION.

Patent assigned to Army,
by Johann Holzer, Richard F. Grantges, and Martin Weinstock. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Multichannel telephone systems, Digital systems), Modulation, Pulse communication systems, Data transmission systems, Multiplex, Voice communication systems.

A telephone system is provided in which each telephone set provides facilities to convert speech signals into digital information and reconvert digital information into audible signals. All information is transmitted in binary digital form and on a time division basis.

Patent 3,171,089 Div. 5

DIODE RANDOM NOISE GENERATOR.
Patent assigned to Army,
by Erwin Hirschmann and George N. Kambouris.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Pulse generators, Avalanche diodes), (*Noise generators, Avalanche diodes), (*Avalanche diodes, Pulse generators), Patents.

The noise generator utilizes the reverse breakdown characteristic of avalanche diodes. In the circuit the noise output of one diode randomly varies the bias voltage of a second diode. The circuit includes a power supply, a bias resistor, a coupling capacitor, a load resistor, and a bias supply. The noise output from the second diode is conducted through a capacitor to an output terminal.

PB-166 875 Div. 5
CFSTI Prices: HC$4.00 MF$1.00

Electronics Research Lab., Montana State Coll., Bozeman.
SPEECH-SIGNAL PROCESSING AND APPLICATIONS TO SINGLE SIDEBAND.
Final rept.,
by N. A. Shyne. Mar 62, 121p
Contract AF19 604 7365, Proj. 4610, Task 46102
AFCRL 62-64; AD 276 850
Unclassified report

Descriptors: (*Single sideband communication systems, Intelligibility), (*Intelligibility, Auditory signals), (*Speech, Intelligibility), (*Voice communication systems, Noise), Sidebands, Narrowband, Audio-frequency, Psychoacoustics, Signal-to-noise ratio, Analog systems, Iterative methods, Recording systems, Mapping (Transformations), Mathematical analysis.

The results of signal processing as applied to SSB (single sideband) systems is described. A review of processing as applied to audio signals is presented and the equivalence of intelligibility scores for fixed- and variable-volume listening conditions is cited. Minor intelligibility increases were found for clipping defined at audio. For clipping defined at narrow-band and in conjunction with finite degrees of clipping at audio, DSB, and SSB these linear operations generally give rise to intelligibility degradation. Intelligibility considerations for an audio AVC unit indicate that, under certain conditions, the AVC unit provided nearly the same intelligibility increases as 12 db of audio clipping. The three most fundamental (and accurate) intelligibility estimates were made for: audio, DSB, and SSB clipping with clipping defined at narrow-band. Of these, SSB clipping provided the most significant increase (for a given signal peak value) and at the same time more fully preserved signal quality. The final consideration was a reduced-clipping signal condition and its effect upon the intelligibility estimates for audio and SSB clipping. For both audio and SSB, the reduced-clipping signal yielded lower intelligibility scores.

6. Detection

Patent 3,164,823 Div. 6, 8, 18

SYMBOL GENERATING SYSTEM FOR CRT DISPLAYS EMPLOYING RETRACE INSERTION.
Patent assigned to Navy,
by Frank B. Uphoff. 5 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Plan position indicators, Sweep generators), (*Sweep generators, Plan position indicators), (*Antisubmarine warfare, Display systems), Cathode ray tube screens, Tactical warfare, Patents.

The system is useful in anti-submarine warfare to display the parameters of a tactical situation. The system extends the effectiveness of cathode ray tube indicators employed as electronic plotters in tactical data presentation systems. An arrangement is disclosed for generating and displaying discriptive symbols associated with retrace inserted dots representing parameters of a tactical situation.

Patent 3,166,704 Div. 6, 8

SERVO MECHANISM TRANSIENT AND VELOCITY ERROR COMPENSATION MEANS.
Patent assigned to Navy,
by Arnolds Jansons. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Servomechanisms, Radar equipment), (*Radar equipment, Radar tracking), Patents, Electric switches, Synchros, Search radar, Voltage regulators, Transients, Velocity, Errors.

The servo compensation network programmer is used in a radar system. A switch element is actuated by a radar antenna programmer drive system to alternately apply positive and negative direct current voltages to the servo compensation lead-lag capacitor component for the purpose of reducing transient and velocity errors in the searching mode of operation of the radar.

Patent 3,166,730 Div. 6

ANNUALAR ELECTROSTRICTIVE TRANSDUCER.
Patent assigned to Navy,
by James R. Brown, Jr. and John D. Wallace. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Transducers, Electrostriction), Ceramic materials, Hydrophones, Underwater sound equipment, Diaphragms (Mechanics).

The electromechanical transducer embodies an annulus of ceramic material. It is particularly useful when embodied in a hydrophone for use in an underwater acoustical apparatus. The structure embodies the ceramic annulus adhered to a diaphragm at points of maximum strain and minimum stress.

Patent 3,170,135 Div. 6

PHASE MULTIPLIER TRANSDUCER ARRAY.
Patent assigned to Navy,
by John J. Yagelowich. 16 Feb 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Electroacoustic transducers, Underwater sound), (*Underwater sound, Electroacoustic transducers), Hydrophones, Patents.

An electronic circuit is provided in combination with a few hydrophones to simulate the results obtained with a large array of many hydrophones. The system is for underwater use. The circuit multiplies the phase displacement between a pair of signals.

Patent 3,171,095 Div. 6, 30

STREAM AND SOUND SPEED INSTRUMENT.
Patent assigned to Navy,
by Jervis J. Gennari. 23 Feb 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Sound, Velocity), (*Flowmeters, Sonar equipment), Water, Fluid flow, Measurement, Underwater sound equipment, Transducers, Transmitter-receivers, Circuits, Oscillators, Feedback, Patents.

The meter is mounted in a housing which is placed in a recess of the hull of a ship carrying various types of sonar equipment. The housing has a cover plate which in use is flush with the outer casing of the hull of the ship. The components of the meter include two sound transducers, each having a transmitter and a receiver and a U-shaped reflector plate mounted in the housing. The electric circuit has two oscillators with feedback paths. The cover plate has a pair of apertures. A mixer combines the signals from the oscillators to produce the sum and difference of their frequencies.

Patent 3,171,118 Div. 6, 22

DELAY LINE STORAGE SYSTEM.
Patent assigned to Navy,
by Torrence H. Chambers and Lawrence F. Kalnoskas.
23 Feb 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Detectors, Radar signals), (*Delay lines, Moving target indicators), (*Radar equipment, Delay lines), Search radar, Signal-to-noise ratio, Correlation techniques, Data storage systems, Patents, Target position indicators.

An object locator system is provided in which periodic signals are analyzed to obtain location information. The system includes a signal recirculation loop, an arrangement for periodically gating the loop, and frequency selective filters. The radar system provides for the storage and reproduction of stored signals.

Patent 3,171,119 Div. 6, 30

BINOMIAL SEQUENTIAL DETECTOR.
Patent assigned to Navy,
by Carlos Nuese and James W. Caspers. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Detectors, Radar signals), (*Radar, Target discrimination), Signal-to-noise ratio, Sequential analysis, Decision theory, Radar antennas, Crystal video receivers, Computers, Ranges (Distance).

The radar detection system is subject to programming techniques for a digital computer. A system is shown wherein the antenna of the system is held in position only long enough to decide between target and noise. The system does not require a multiplicity of operators.

7. Electrical Equipment

N65-16446 Div. 7
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
CALIBRATION OF SOLAR CELLS USING HIGH-ALTITUDE AIRCRAFT,
by Henry W. Brandhorst, Jr. and Earle O. Boyer.
Feb 65, 23p NASA-TN-D-2508
Unclassified report

Descriptors: (*Solar cells, Calibration).

8. Electronics and Electronic Equipment

Patent 3,166,711 Div. 8

DUAL DIVERSITY SWITCHING UNIT.
Patent assigned to Navy,
by Kelton C. Agrelius. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Switching circuits, Patents), Antennas, Relaxation oscillators, Automatic gain control, Amplifiers, Signals, Voltage, Selection, Design, Patents.

The dual diversity switching unit selects the strongest signal from at least four different receivers, each receiver receiving a signal through an antenna which is in diversity with the remainder of the antennas.

Patent 3,166,718 Div. 8

PULSE GENERATOR EMPLOYING SHOCK-EXCITED CIRCUIT AND FIRST AND SECOND VARIABLE-BIAS MEANS FOR STABILITY AND FREQUENCY ADJUSTMENT.
Patent assigned to Navy,
by Joseph J. Zyskowski. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Pulse generators, Design), (*Oscillators, Circuits), Electronic switches, Frequency converters, Electromagnetic pulses, Patents.

A pulse generator circuit is provided wherein signals from a sawtooth generator initiate oscillations in a shock-excited oscillator whose frequency is able to be converted. The generator provides stable output pulses of adjustable frequency rates.

Patent 3,166,747 Div. 8

FM-AM CORRELATION RADAR SYSTEM.
Patent assigned to Navy,
by Donald J. Adrian. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Radar equipment, Correlators), (*Correlators, Radar equipment), Frequency modulation, Amplitude modulation.

The radar system has a reduced response to zero delayed signals. The system RF energy supplied by an oscillator is coupled to a transmitting antenna through a modulator. The energy is FM modulated by a signal from an FM signal generator and AM modulated by an AM signal. The reflected signal received in a receiving antenna is mixed in a mixer, detected in a detector, mixed in a second mixer, integrated in an integrator and coupled to a terminal coupled to an indicator. The output of the modulator is coupled directly as an input to the first mixer and the output of the AM signal generator is coupled through a variable delay circuit as an input to the last mentioned mixer.

Patent 3,169,311 Div. 8

METHOD OF MAKING A DISH-SHAPED ANTENNA REFLECTOR.
Patent assigned to Navy,
by Bernard I. Small and Jack H. Jensen. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Parabolic antennas, Reflectors), (*Reflectors, Antenna components), Expanded plastics, Coatings, Conductivity, Metals, Manufacturing methods, Patents.

The antennas are fabricated from blocks of easily-worked material such as foam plastic, these blocks being initially machined to provide a desired reflector curvature which then is built-up by the application of a plaster-like coating that can be accurately reshaped, preferably, while in a partially-set condition. The reflective surface may be provided by applying an outer coating of a conductive metal.

Patent 3,170,123 Div. 8

TUNNEL DIODE OSCILLATOR.
Patent assigned to Army,
by Victor Boxer. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Pulse generators, Oscillators), (*Oscillators, Tunnel diodes), Circuits, Batteries and components, Patents.

The pulse generator operates on the millimicrosecond range of pulse width. The device includes a battery, a tunnel diode and a saturable reactor connected in series.

Patent 3,170,155 Div. 8, 30

QUANTIZER.
Patent assigned to Air Force,
by Blanchard D. Smith, Jr. and Arthur H. Ballard.
16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Analog-to-digital converters, Coding), (*Coding, Analog-to-digital converters), Patents.

The system is capable of converting smoothly varying analog functions, such as represented by shaft rotations, translatory motions, electron beam deflections, and the like. The quantizer uses a specific cyclic binary-decimal code to permit unambiguous readings to be taken from the shaft digitizers and converting the readings to an unambiguous binary-decimal code.

Patent 3,170,158 Div. 8

MULTIPLE BEAM RADAR ANTENNA SYSTEM.
Patent assigned to Air Force,
by Walter Rotman. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Radar scanning, Multiple beam antennas), (*Multiple beam antennas, Radar scanning), Radar antennas, Electromagnetic waves, Phase shifters, Patents.

An antenna system is disclosed in which a sector of air space is scanned by a radar beam from multiple sources for detecting intruder aircraft. A number of waves of electromagnetic energy are generated with discrete angular spacings and scanning is accomplished by varying electrical path lengths encountered by each of the waves in a phase shifter bank.

Patent 3,171,041 Div. 8

SINGLE INPUT GATE CONTROLLING CIRCUIT.
Patent assigned to Navy,
by Charles W. Haase. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Relaxation oscillators, Gates (Circuits)), (*Gates (Circuits), Electronic switches), (*Electronic switches, Gates (Circuits)), Control systems, Electronic equipment, Patents.

The single input gate controlling circuit is for use in an electronic receiving system. The circuit includes a monstable multi-vibrator which has a first and a second state, the first state being stable. An input source is connected to the multivibrator. Components are provided for prematurely triggering the first state and for delaying the triggering of the second state. An output is connected to the stable side of the multivibrator.

Patent 3,171,048 Div. 8, 25

CRYSTAL FREQUENCY TEMPERATURE COMPENSATION.
Patent assigned to Army,
by Eduard A. Gerber. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Temperature sensitive elements, Frequency stabilizers), (*Frequency stabilizers, Temperature sensitive elements), (*Piezoelectric crystals, Stabilization), Crystallography, Patents.

The temperature compensating device is for a piezoelectric crystal. Slots are cut within the body of the crystal and slugs are mounted within the slots. The slugs must have a higher coefficient of expansion than the crystal to provide compensation for the higher temperature or a lower coefficient of expansion to provide compensation for the lower temperature frequency variations.

Patent 3,171,085 Div. 8

UNILATERALIZED TRANSISTOR AMPLIFIER.
Patent assigned to Navy,
by Lucio M. Valese. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Transistor amplifiers, Feedback), (*Feedback amplifiers, Transistors), (*Transistors, Electrodes), (*Electrodes, Transistors), Patents, Impedance matching.

The unilateral transistor amplifier includes a pair of complementary, three-electrode transistors, the collector of the first being tied to the base of the second and the collector of the second being tied to the base of the first, the second transistor being employed to feed back a signal from the collector to the base of the first transistor. The base electrode of the first transistor is employed as the input, and an impedance in the emitter circuit of the feedback transistor permits adjustment of the phase and magnitude of the feedback signal.

Patent 3, 171, 086 Div. 8

TRAVELING WAVE AMPLIFIER AND OSCILLATOR WITH TUNNEL DIODES.
Patent assigned to Army,
by Horst W. A. Gerlach. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Traveling-wave tubes, Tunnel diodes), (*Microwave oscillators, Tunnel diodes), (*Tunnel diodes, Traveling-wave tubes), Patents, Feedback, High frequency.

The tunnel diode traveling wave device is capable of high power output. A high-frequency negative-resistance two-terminal device is incorporated in a periodic slow wave structure which serves as the energy pump for the slow wave structure.

Patent 3,171,120 Div. 8, 22

CLEARANCE LINE GENERATING SYSTEM.
Patent assigned to Navy,
by Theodore L. Beeler and Leighton B. Cooke.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Fire control system components, Radar equipment), (*Radar equipment, Fire control system components), (*Plan position indicators, Fire control system components), Ship structural components, Tolerances (Mechanics), Radar scanning, Patents.

The system includes electronic circuitry for generating clearance lines to be displayed on a plan position indicator. The equipment can be adjusted on shipboard to accurately display on the PPI scope the clearance conditions of any ship, that is, that a missile launcher is clear of the ship's superstructure.

Patent 3,171,122 Div. 8, 5, 6

IFF SYSTEM DEFRUITER MODIFICATION.
Patent assigned to Navy,
by Bernarr H. Humphreys. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Identification systems, Decoding), Display systems, Visibility, Video signals, Radar interference, Patents, Transponders.

The defruiter modification is utilized in an IFF system. The 'fruit' is considered to be unsynchronized replies from associated transponders as well as the replies to the other interrogators operating in the vicinity of the associated transponders. The defruiter is compatible with existing switchboard equipment. The system includes a bracket decode technique.

PB-166 832 Div. 8, 1, 30
CFSTI Prices: HC$5.00 MF$1.00

Naval Ammunition Depot, Crane, Ind.
MICRO-NOTES. INFORMATION ON MICROELECTRONICS FOR NAVY AVIONICS EQUIPMENT.
1 Oct 64, 156p Micro-Notes no. MN-8, QE/C-64-607
Tasks RAV03D001 3231R008 03 01,
RAV03J002 2021R008 03 01
AD 449 495, N64 32931
Unclassified report

Research made in cooperation with Naval Air Development Center, Johnsville, Pa Aeronautical Electronic and Electrical Lab.

Descriptors: (*Naval equipment, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Naval equipment), (*Electronic equipment, Airborne), Power supplies, Standardization, Relaxation oscillators, Data transmission systems, Digital computers, Circuits, Semiconductor devices.

Contents: Power supplies for microelectronic equipments; microelectronic function device type MA/AA20-01 (bistable multivibrator), evaluation of signetics digital microelectronic functional devices, data link equipment AN/ASW-25 (XN-1), airborne digital computer AN/ASA-27, compilation of microelectronic functional devices evaluated to date, analysis of remington rand univac's studies of failure modes of microelectronics.

PB-166 833 Div. 8, 1
CFSTI Prices: HC$7.00 MF$1.75

Naval Ammunition Depot Crane, Ind.
MICRO-NOTES. INFORMATION ON MICROELECTRONICS FOR NAVY AVIONICS EQUIPMENT.
1 Dec 64, 341p Micro-Notes no. MN-9, QE/C-64-782
Tasks RAV03D001 3231R008 0301, RAV03J002 2021R008 03 01
AD 452 571

Unclassified report

Research made in cooperation with Naval Air Development Center, Johnsville, Pa., Aeronautical Electronic and Electrical Lab.

Descriptors: (*Microminiaturization (Electronics), Naval equipment), (*Naval equipment, Microminiaturization (Electronics)), (*Electronic equipment, Airborne), Epitaxial growth, Failure (Mechanics), Malfunctions, Power supplies, Modules (Electronics), Semiconductor devices, Circuits, Digital systems, Gales (Circuits), Voltage, Data transmission systems, Integrated circuits.

Contents: Microelectronic Power Supply Program; Resume of Epitaxial Studies Report; Evaulation of Siliconix Digital Microelectronic Functional Devices; Evaluation of General MicroElectronics Digital Microelectronic Functional Devices; Evaluation of Sylvania Digital Microelectronic Functional Devices; Failure Analysis and Reliability Estimates of AN/ASW-25(XN-) Microelectronic Digital One-Way Data Link; Compilation of Microelectronic Functional Devices Evaluated to Date.

PB-166 834 Div. 8, 1, 19, 30
CFSTI Prices: HC$5.00 MF$1.25

Naval Ammunition Depot, Crane, Ind.
MICRO-NOTES. INFORMATION ON MICROELECTRONICS FOR NAVY AVIONICS EQUIPMENT.
1 Jun 64, 197p Micro-Notes no. MN-6, QE/C-64-411
Tasks RAV03D001 3231R008 03 01,
RAV03J002 2021R008 03 01
AD 440 917

Unclassified report

Research made in cooperation with Naval Air Development Center, Johnsville, Pa., Aeronautical Electronic and Electrical Lab.

Descriptors: (*Naval equipment, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Naval equipment), (*Electronic equipment, Airborne), Circuits, Semiconductor devices, Loran equipment, Digital systems, Data transmission systems, Gates (Circuits).

Contents: Summary of active avionics programs utilizing microelectronic techniques; resume of field-effect analysis; microelectronic approach to data link equipment AN/ASW-25 (XN-1); summary of battelle memorial institute program on microelectronic functional devices, microelectronic approach to the design of the Loran C navigation set AN/ARN-76(XN-1); evaluation of minneapolis - honeywell's series of digital microelectronic functional devices.

PB-166 859 Div. 8, 30
CFSTI Prices: HC$1.00 MF$0.50

Little (ArthurD.), Inc., Cambridge, Mass.
ANALYTIC APPROXIMATION AND TRANSLATIONAL INVARIANCE IN CHARACTER RECOGNITION,
by R. F. Meyer, V. E. Giuliano, and P. E. Jones.
1962, 14p

Unclassified report

Reprinted from the book Optical Character Recognition, p181-195.

Descriptors: (*Invariance, Character recognition), (*Optical images, Character recognition), Coding, Classification, Identification, Transformations (Mathematics), Video signals.

9. Fluid Mechanics

N65-14559 Div. 9
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
AN ANALYSIS OF THE PROBLEM OF TANK PRESSURIZATION DURING OUTFLOW,
by William H. Roudebush. Jan 65, 28p
Rept. no. NASA-TN D-2585

Unclassified report

Descriptors: (*Propellant tanks, Fluid mechanics), (*Fluid mechanics, Propellant tanks), Pressure vessels.

N65-14561 Div. 9, 12
CFSTI Prices: HC$2.00 MF$0.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LAMINAR BOUNDARY-LAYER SEPARATION INDUCED BY FLARES ON CYLINDERS WITH HIGHLY COOLED BOUNDARY LAYERS AT A MACH NUMBER OF 15,
by Donald N. Kuehn. Jan 65, 34p NASA TN-D-2610

Unclassified report

Descriptors: (*Laminar boundary layer, Separation), (*Hypersonic flight, Aerodynamic characteristics).

N65-14627 Div. 9, 27, 30
CFSTI Prices: HC$5.00 MF$1.00

George C. Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
A FORTRAN PROGRAM TO CALCULATE THE FLOW FIELD AND PERFORMANCE OF AN AXIALLY SYMMETRIC deLAVAL NOZZLE,

by D. Thompson, E. H. Ingram, C. T. K. Young and J. B. Cox. Jan 65, 159p NASA-TN-D-2579
Unclassified report

Descriptors: (*Programming (Computers), Fluid mechanics), (*Laval nozzle, Performance (Engineering)), Axially symmetric flow, Thermodynamics.

N65-15613 Div. 9, 12
CFSTI Prices: HC$2.00 MF$0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF LENTICULAR AND ELLIPTIC SHAPED CONFIGURATIONS AT A MACH NUMBER OF 6,
by J. Wayne Keyes. Feb 65, 30p NASA-TN-D-2606
Unclassified report

Descriptors: (*Aerodynamic configurations, Aerodynamic characteristics), (*Hypersonic flow, Aerodynamic characteristics), (*Reentry vehicles, Lift).

N65-15745 Div. 9, 30
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge.
A DESCRIPTION OF A COMPUTER PROGRAM FOR THE STUDY OF ATMOSPHERIC EFFECTS ON SONIC BOOMS,
by Manfred P. Friedman. Feb 65, 73p
Contract NAS1 2511
NASA CR-157
Unclassified report

Descriptors: (*Programming (Computers), Sonic boom), (*Sonic boom, Shock waves).

10. Fuels and Combustion

PB-166 818 Div. 10, 32
CFSTI Prices: HC$4.00 MF$1.00

Consolidation Coal Co., Library, Pa. Research Div.
PIPELINE GAS FROM LIGNITE GASIFICATION. A FEASIBILITY STUDY. APPENDIX.
13 Jan 65, 146p Rept. no. R-1 App
Contract 14 01 0001 415, Proj. 180
Unclassified report

Descriptors: (*Coal gas, Manufacturing methods), (*Coal, Economic geology), (*Economic geology, Coal), Labor, Water supplies, Manpower studies, Purification, Costs, Mining engineering, Distribution (Economics), Consumption, Feasibility studies, Urban areas, Maps, Tables.

Contents:
Lignite reserves and mining costs
Lignite gasification and process economics
Outlook to 1975 on gas consumption and prices in potential markets for Dakota lignite gas.

11. Ground Transportation Equipment

No Entries

12. Guided Missiles

N65-14116 Div. 12
CFSTI Prices: HC$3.00 MF$0.75

Michigan Univ., Ann Arbor.
HODOGRAPH ANALYSIS OF THE FREE-FLIGHT TRAJECTORIES BETWEEN TWO ARBITRARY TERMINAL POINTS,
by Fang Toh Sun. Jan 65, 77p
Grant NsG558
NASA CR-153
Unclassified report

Descriptors: (*Free flight trajectories, Analysis).

N65-14628 Div. 12, 2
CFSTI Prices: HC$2.00 MF$0.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SOME EFFECTS OF UNCERTAINTIES IN ATMOSPHERE STRUCTURE AND CHEMICAL COMPOSITION ON ENTRY INTO MARS,
by Robert L. McKenzie. Jan 65, 37p
NASA-TN-D-2584
Unclassified report

Descriptors: (*Mars probes, Planetary atmospheres), (*Planetary atmospheres, Atmosphere entry).

N65-14632 Div. 12
CFSTI Prices: HC$2.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
MARS NONSTOP ROUND-TRIP TRAJECTORIES,
by Roger W. Luidens and Jay M. Kappraff.
Jan 65, 41p NASA-TN-D-2605
Unclassified report

Descriptors: (*Mars probes, Trajectories), (*Astronautics, Mars probes).

N65-15153 Div. 12, 1
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Washington, D. C. Technology Utilization Div.
INDEX TO NASA TECH BRIEFS.
Issue no. 1.
Jan 65, 54p Rept. no. NASA SP-5021
Unclassified report

Descriptors: (*Space flight, Scientific research), Indexes, Reports.

This Index to NASA Tech Briefs has been prepared as a guide to technological innovations derived from the NASA space program. The publication is arranged in two major sections: the first contains a listing of the citations and abstracts of all NASA Tech Briefs published to date, arranged by subject category for ease of scanning; the second comprises three indexes: Subject Index, Originator/Tech Brief Number Index and Tech Brief/Originator Number Index. Each Tech Brief citation is prefixed by a Tech Brief number. The separate indexes contain explanatory notes which guide the user to the desired Tech Brief. (Author)

N65-15406 Div. 12, 5
CFSTI Prices: HC$2.00 MF$0.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TELEMETRY AND COMMAND TECHNIQUES FOR PLANETARY SPACECRAFT,
by J. C. Springett. 15 Jan 65, 38p
Technical rept. no. JPL-TR-32-495 Unclassified report
NASA CR-60336

Descriptors: (*Telemeter systems, Spacecraft), (*Command and control systems, Spacecraft).

N65-15528 Div. 12
CFSTI Prices: HC$1.00 MF$0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
APPLICATION OF A BANG-BANG CONTROL SYSTEM TO TWO SPINNING SPACE VEHICLES,
by Paul S. Rempfer and Jerrold H. Suddath.
Jan 65, 27p NASA-TN-D-2596
Unclassified report

Descriptors: (*Spacecraft, Attitude control systems), (*Attitude control systems, Spacecraft), Spin.

N65-15548 Div. 12
CFSTI Prices: HC$2.00 MF$0.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
EXPERIMENTAL INVESTIGATION OF ELECTRIC DRAG ON SPHERICAL SATELLITE MODELS,
by William C. Pitts and Earl D. Knechtel.
Feb 65, 43p NASA-TN-D-2619
Unclassified report

Descriptors: (*Satellites (Artificial), Drag).

N65-15609 Div. 12
CFSTI Prices: HC$3.00 MF$0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A PARAMETRIC STUDY OF MASS-RATIO AND TRAJECTORY FACTORS IN FAST MANNED MARS MISSIONS,
by Duane W. Dugan. Feb 65, 79p NASA-TN-D-2225
Unclassified report

Descriptors: (*Mars probes, Astronautics), (*Astronautics, Mars probes).

N65-15625 Div. 12
CFSTI Prices: HC$1.00 MF$0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A FLIGHT INVESTIGATION OF THE SCOUT FOURTH-STAGE DIAPHRAGM SEPARATION DISTURBANCES,
by Seymour Salmirs. Feb 65, 20p
NASA-TN-D-2593
Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Staging), Fourth-stage motors.

Patent 3,169,444 Div. 12

TRAIN POSITIONER AND INTERLOCK ASSEMBLY.
Patent assigned to Navy,
by Myron J. Bauer and Judson C. Higgins. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Guided missile launchers, Design), Patents.

The missile launching system has a launcher arm mounted on a rotatable base ring which is positioned, by a stationary stand, above a rotatable magazine having two separate rings of missiles. A train positioner and interlock assembly is provided which carries a latch mechanism to engage the rotatable base ring and to position the base ring for transfer of the missile and to securely lock the base ring in that position during the transferring operation.

Patent 3,169,484 Div. 12, 30

SELF-CONTAINED TEST DEVICE FOR ORDNANCE MISSILES.
Patent assigned to Army,
by Jacob Rabinow and Evert Blomgren. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Test equipment (Electronics), Circuits), (*Guided missile warheads, Test equipment (Electronics), Arming devices, Safety, Voltage, Patents.

The test device is for determining whether a missile is in safe condition or unarmed condition. The function of the invention is to test the continuity of a circuit which includes two switches within the missile. This is accomplished by inducing a voltage in two coils and connecting the coils in series with a test lamp.

Patent 3,169,724 Div. 12

SPACE VEHICLE REENTRY SENSOR.
Patent assigned to Navy,
by James M. Perkins and Robert J. Twiford.
16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Reentry vehicles, Temperature sensitive elements), (*Temperature sensitive elements, Reentry vehicles), (*Atmosphere entry, Temperature sensitive elements), Electric switches, Circuits, Monitors, Ablation, Degradation, Patents.

The sensor is for energizing an electrical circuit at a predetermined time or elevation after re-entry of a space vehicle into the earth's atmosphere. In an embodiment, the heat sensitive element is a predetermined thickness of the ablation material of which the nose is constructed. The ablation material has a rate of disintegration that is very closely predictable so that after a predetermined amount of ablation, a switch within the vehicle nose is actuated to energize the electrical circuit.

Patent 3,169,725 Div. 12

ERECTABLE MODULAR SPACE STATION.
Patent assigned to NASA,
by Rene A. Berglund. 16 Feb 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Space stations, Modular space construction), (*Modular space construction, Space stations), Astronautics, Spacecraft docking, Patents.

The space station may be collapsed to facilitate launching and thereafter be erected into an operable structure. The space station includes a hub which is the nucleus of the station. The hub includes a zero-gravity (zero-g) laboratory which is mounted on an air-bearing fixed therein. The hub also includes structure for docking space vehicles to the space station. Radiating from the hub are access passages connected to the rigid sections or compartment which surround the hub and form the living quarters. The passages or access tubes are telescoping in nature and of rigid construction.

Patent 3,169,727 Div. 12, 19

MULTIPLE FLIGHT COURSE SECOND ORDER MISSILE PROGRAMMER.
Patent assigned to Navy,
by Irvin H. Schroader, Melvin E. Hosea, and Leo C. Miller. 16 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Guided missile, Midcourse guidance), (*Midcourse guidance, Guided missiles), (*Analog computers, Navigation computers), (*Navigation computers, Guided missiles), Multiple operation, Servomechanisms, Radar equipment, Patents.

The multiple flight course second order missile programmer includes an electronic analog computer in combination with a series of servo systems and working with necessary input and output radar systems, including the power, cabling and switching necessary to implement the latter. The resulting system is thereby rendered capable of accepting radar data in synchro form and, through the use of follow-up servo systems, of converting this data to D. C. signal form for utilization by the electronic analog programming computer section to provide the required missile flight program in accordance with prescribed trajectory equations.

Patent 3,170,371 Div. 12, 31

MISSILE SNUBBER MECHANISM.
Patent assigned to Navy,
by Josef W. Zimmer and Melvin Appelman.
23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Guided missile launchers, Shipborne), Pistons, Actuators, Patents.

The mechanism is used within a shipboard launcher cell which may be elevated and trained in azimuth, like a deck gun. The retractable snubber system engages a missile and restrains it in fixed position within the launcher cell until the missile is to be launched. It relieves the lugs from damaging forces resulting from ship movement. The snubbers generally are in the form of a piston and cylinder combination.

Patent 3,170,655 Div. 12, 1

HORIZON SCANNING METHOD FOR FIRING ROCKET STAGE.
Patent assigned to Navy,
by Firth Pierce. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Horizon scanners, Rocket igniters), (*Rocket igniters, Horizontal scanners), Infrared equipment, Rockets, Stagings, Payload, Launching, Flight control systems.

An infra-red horizon scanning mechanism is utilized in a multiple stage spin stabilized rocket that trails during initial flight. A horizon scanner is mounted at an angle to the longitudinal axis of the vehicle and sweeps out a cone which senses the earth's horizon while the vehicle is at a slightly positive attitude and activates a rocket stage.

Patent 3,170,656 Div. 12

RAM PRESSURE STEPPING MOTOR CONTROL FOR MISSILE GUIDANCE.
Patent assigned to Navy,
by Richard W. Cole. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Guided missile components, Servomechanisms), (*Servomechanisms, Guided missile components), Pressure switches, Guidance, Control, Patents, Ramjet engines.

A plurality of pressure switches are positioned in a manifold that is exposed to a source of ram pressure, a stepper motor controlled by a regulator circuit controlled by the pressure switches, and a load comprising a plurality of compensation switch cards. Each compensation switch card can be rotated through twelve positions. That is, each position is connected to a corresponding pressure switch which determines when that position will be connected to an attenuator, limit or clamp in the guidance system that needs adjustment during flight. Attached to each position of the switch card is a suitable resistor for adjusting a specific part of the guidance system to which it is connected, for a small period of flight.

13. Installations and Construction

Patent 3,170,471 Div. 13, 12

INFLATABLE HONEYCOMB.
Patent assigned to NASA,
by Emmanuel Schnitzer. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Inflatable structures, Honeycomb cores), (*Honeycomb cores, Inflatable structures), Sandwich panels, Sandwich construction, Laminates, Plastics, Metals, Sheets, Films, Patents.

The honeycomb core element for an inflatable panel is useful in the construction of a lightweight space satellite. The structure is made of panel or envelope elements, each having flexible outer skin members and a flexible perpendicularly disposed honeycomb core element placed between the skin members to form cells. The structure is made of flexible plastic film with a thin layer of metal placed on it to strengthen the plastic.

Patent 3,170,473 Div. 13, 26

CAPTIVE BOLT.
Patent assigned to Army,
by Ernest W. Downs and Philias F. LaCasse.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Bolts, Beams (Structural)), Tents, Supports, Fastening, Patents.

The captive bolt assembly may be used as a primary load carrying connection between the purlins and end arches of tent frames. A knockdown portable tent frame is claimed which may be assembled and disassembled in the field. The purlins are threaded to receive the threaded end of the bolt. The bolt has a head and passes through an arch member before being threaded into the purlin. A pin is provided in the shank of the device.

14. Materials (Non-Metallic)

N65-15534 Div. 14, 17
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
MAGNETIC SUSCEPTIBILITIES OF COMPOSITIONS IN TANTALUM-TANTALUM CARBIDE SYSTEM,
by Gilbert J. Santoro. Jan 65, 14p NASA-TN-D-2638
Unclassified report

Descriptors: (*Carbides, Magnetic properties), (*Tantalum compounds, Carbides), Composite materials.

Patent 3,167,384 Div. 14, 4

PROCESS OF RENDERING CELLULOSIC TEXTILES WRINKLE RESISTANT BY REACTING WITH BIS (N-METHYLOL CARBAMOYLETHYL) METHYLAMINE.
Patent assigned to Agriculture,
by Bethlehem K. Andrews and John G. Frick, Jr.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Cellulose, Textiles), (*Textiles, Processing), Amines, Amides, Carboxylic acids, Synthesis (Chemistry), Fibers (Synthetic), Patents.

Wrinkle resistance in cellulosic textiles is produced by treatment with the polymethylol derivative of a new class of polyamides of polycarboxylic acids which are unsubstituted on the amido nitrogen, and which contain a tertiary amino group in the carboxylic acid moiety. The aqueous treating solution contains from 0.5 to 3.0 percent of an acid catalyst and from 1 to 20 percent of bis(N-methylol carbamoylethyl) methylamine.

Patent 3,169,140 Div. 14, 4

CARBOXYLATED DERIVATIVES OF OLEYL ALCOHOL AND METHOD OF PREPARATION.
Patent assigned to Agriculture,
by Edward T. Roe and Daniel Swern. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Alcohols, Chemical reactions), (*Alkenes, Chemical reactions), (*Fatty acids, Synthesis (Chemistry)), (*Fatty acid esters, Synthesis (Chemistry)), Carbon compounds, Monoxides, Sulfuric acid, Carboxylic acids, Polyester plastics, Polyamide plastics, Plasticizers, Lubricants, Hydraulic fluids, Patents.

Direct carboxylation of long chain olefinic compounds with carbon monoxide is achieved at atmospheric pressure by employing a narrow range of operating conditions in which the concentration of sulfuric acid and also the molar ratio of sulfuric acid to the long chain olefinic compound must be regulated. The products may be used in the manufacture of alkyd resins, polyesters, polyamides, plasticizers, synthetic lubricants, and hydraulic fluids.

Patent 3,169,924 Div. 14, 4

ALKALI FUSION OF COPOLYMERS OF MONOOLEFINS AND VINYL ESTERS.
Patent assigned to Esso Research and Engineering Co.,
by Arnold J. Morway and Jeffery H. Bartlett. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Preparation), (*Alkenes, Copolymerization), (*Esters, Copolymerization), Polyethylene plastics, Vinyl plastics, Fatty acids, Salts, Alkali metals, Liquid metals, Oils, Greases, Acetates, Patents.

A lubricating grease that shows good resistance to fluidization upon working containing a major amount of either a mineral or a synthetic lubricating oil. The lubricating grease also contains from 5 to 40 weight percent of a metal salt formed by the alkali fusion of from 1 to 30 parts by weight of a copolymer of a vinyl ester of a C2 to C16 aliphatic alpha olefin to one part by weight of a vinyl ester of a C2 to C5 monocarboxylic acid. The alkili metal salt in this composition may also include from 0.5 to 10.0 parts of C13 to C30 fatty acid.

Patent 3,169,926 Div. 14, 4, 10

STABILIZATION OF ORGANIC SUBSTANCES.
Patent assigned to Universal Oil Products Co.,
Des Plaines, Ill.
by Ted Symon. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Organic materials, Stabilization), (*Lubricant additives, Ethers), (*Antioxidants, Ethers), Fuel additives, Polyethylene plastics, Fats, Oils, Greases, Degradation, Discoloration, Amines, Patents.

Motor fuels and lubricating oils, polyolefins, edible fats and oils, and natural or synthetic greases are stabilized against oxidative deterioration by adding an N-acyl-diaminodiphenyl ether. Concentration may range from 0.0001% by weight to 5%. Acetyl or benzoyl radicals attached to a nitrogen atom in a monoacyl diaminodiphenyl ether inhibit the formation of gum in oils at high temperatures and reduce discoloration in high molecular weight (10,000 and above) polyolefins during high temperature oxidation. The inhibitor is not reactive with other additives (pour-point depressants, dyes, anti-foaming agents, etc.). The use of a metal deactivator is sometimes recommended.

Patent 3,170,773 Div. 14, 17

REINFORCED METALLIC COMPOSITES.
Patent assigned to NASA,
by John W. Weeton, David L. McDaniels, Robert W. Jech, Robert E. Oldrieve, and Donald W. Petrasek. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Tungsten, Fiber metallurgy), (*Composite materials, Metals), (*Metals, Composite materials), Reinforcing materials, Patents, Wire, Binders, Copper, Ductility, Cryogenics, Processing, Fibers.

The composite material is composed of high strength fibers such as tungsten fibers at 11 to 87 percent by volume surrounded by and dispersed in a lower strength but more ductile matrix or binder such as copper. The material can be applied at cryogenic temperatures and is useful over a wide range of temperatures.

Patent 3,170,811 Div. 14, 26

PRODUCTION OF FUSED POLYTETRAFLUOROETHYLENE FILM ON ELASTOMERS.
Patent assigned to Navy,
by Arthur G. Sands. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Coatings, Elastomers), (*Halocarbon plastics, Coatings), (*Elastomers, Protective treatments), Lubricants, Films, Processing, Sentering, Patents, Composite materials, Friction.

The products may take the shape of strips applied to metal surfaces to prevent seizing between the parts, or sleeves for rotating or sliding parts to provide a dry lubricant. One product is an elastomer substrate directly coated with a thin film of aluminum and a thin film of fused polytetrafluoroethylene directly coated on the aluminum film.

Patent 3,170,812 Div. 14

METHOD OF VITRIFYING CERAMIC COATINGS.
Patent assigned to AEC,
by Murray A. Schwartz. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Ceramic coating, Heat treatment), Ceramic materials, Patents, Heating, Protective treatments, Beryllium compounds, Carbides, Carbon, Colloids, Oxides, Silicon compounds, Titanium compounds, Lithium compounds, Barium compounds, Sodium compounds, Aluminum compounds, Calcium compounds, Melting, Aging (Materials).

Products coated by this method are used in nuclear reactors. A ceramic coating is vitrified on a beryllium carbide-carbon body by heating it until the coating is partially vitrified and subsequently heating the body by induction heating until the coating is vitrified.

Patent 3,170,878 Div. 14

GREASE COMPOSITION.
Patent assigned to Socony Mobil Oil Co., Inc.,
New York,
by Eldon I. Armstrong. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Greases, Preparation), (*Lubricants, Greases), Lubricant additives, Molybdenum compounds, Sulfides, Life expectancy, Effectiveness, Oils, Soaps, Gels, Carboxylic acids, Aliphatic compounds, Alkali metal compounds, Antioxidants, Molecular weight, Patents.

A grease containing MoS2 is capable of long, effective life in use as a lubricant in electric motor generators and other industrial equipment. The grease contains a lubricating oil vehicle and a gelling agent made from an alkaline earth metal salt of aliphatic monocarboxylic acid. The grease contains from 1 to 65%, by weight, of MoS2, the particles of which have a diameter of less than 10 microns, and preferably less than 2 microns.

Patent 3,170,881 Div. 14, 4

SUPERBASED BARIUM CONTAINING LUBRICANTS.
Patent assigned to Bray Oil Co., Los Angeles, Calif.
by Vanderveer Voorhees. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Barium compounds), (*Oils, Preparation), Colloids, Alkali metal compounds, Alkaline earth metals, Carbonates, Mixtures, Solutions, Carbon dioxide, Impurities, Crankcases, Patents.

A process is devised for making a barium containing crankcase oil which is resistant to sludging resulting from the action of acids formed in automotive engines. A water free mixture is formed from a solution of a preferentially oil soluble sulfonate of an alkali or alkaline earth metal. The mixture is agitated while adding carbon dioxide in the absence of water. The mixture is then heated forming a gummy emulsion whic is boiled with water until the oil is dehydrated.

15. Mathematics

PB-166 844 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Electronics Research Lab., Univ. of California, Berkeley.

THE CONTRACTION THEOREM AND ITS EXTENSIONS AND APPLICATIONS.
Revised ed.,
by B. Whalen. 11 Nov 64, 40p Rept. no. 64-42
Grant NSF G15965
Unclassified report

Revision of report dated 12 Sep 61.

Descriptors: (*Functional analysis, Mapping (Transformations)), (*Mapping (Transformations), Functional analysis), (*Iterative methods, Functional analysis), Real variables, Differential equations, Inequalities, Theory, Integral equations, Sequences.

This report is an exposition of the contraction principle and several of its extensions and applications. In order to demonstrate the power of the theorem it is used to derive sufficient conditions for the existence of a unique solution to algebraic, vector, and differential equations, both linear and nonlinear, and to linear integral equations.

16. Medical Sciences

N65-13546 Div. 16
CFSTI Prices: HC$4.00 MF$0.75

General Technical Services, Inc., Cleveland, Ohio.
ANALYSIS OF THE DYNAMIC SYSTEMS RESPONSE OF SOME INTERNAL HUMAN SYSTEMS,
by A. S. Iberall and S. Z. Cardon. Jan 65, 113p
Contract NASw1066
NASA CR-141
Unclassified report

See also N63-18495.

Descriptors: (*Biology, Control systems), (*Physiology, Control systems).

Patent 3,170,459 Div. 16

BIO-MEDICAL INSTRUMENTATION ELECTRODE.
Patent assigned to Navy,
by Clifford G. Phipps and Glenn F. Kelly.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Electrodes, Medical equipment), (*Medical equipment, Electrodes), Electroencephalography, Electrocardiography, Electronic recording systems, Electrical conductance, Space medicine, Patents.

The electrodes are utilized with electroencephalograph and electrocardiograph devices. The assembly is in the form of a patch comprising a series of superimposed layers of cork, or like insulating material, secured together and supporting therebetween a metal pellet electrode in fixed spaced distance from the skin thus avoiding metal-to-skin contact. The pellet is provided with an electrical conductor for connection into the recording circuit. The hollow space between the pellet and the skin, being of optimum size, is filled with a conductive paste which creates a conductive path therebetween, the composition of the paste being compatible with body saline electrolyte.

PB-166 896 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Public Health Service, Washington, D. C. Div. of Air Pollution.
THE ROLE OF THE SCIENTIST AND THE CITIZEN, A CASE STUDY: AIR POLLUTION,
by V. G. MacKenzie. 1964, 6p
Unclassified report

Presented at the Scientists' Institute for Public Information Symposium of the Annual Meeting of the American Association for the Advancement of Science, Montreal, Canada, 29 Dec 64.

Descriptors: (*Air pollution, Public health), (*Public health, Air pollution), United States Government, Decision making, Scientific personnel, Urban areas, Economics, Control, Symposia.

17. Metallurgy

CAPE-1180 Div. 17

Dow Chemical Co., Denver, Colo.
SAFE EVAPORATOR,
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Evaporators, Mechanical drawings), Plutonium, Solutions, Peroxides, Evaporation, Heat exchangers, Recovery.

Four drawings are included of an evaporator used to evaporate peroxide filtrate for concentrating plutonium solutions and destroying excess peroxide in Pu recovery. Included is a 5 in. ID by 30 in. long heat exchanger. (AEC Abstract)

N65-14558 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
MECHANICAL PROPERTIES OF ARC-MELTED AND ELECTRON-BEAM-MELTED TUNGSTEN-BASE ALLOYS,
by Peter L. Raffo, William D. Klopp, and Walter R. Witzke. Jan 65, 23p NASA-TN-D-2561
Unclassified report

Descriptors: (*Tungsten alloys, Mechanical properties).

N65-15949 Div. 17
CFSTI Prices: HC$2.00 MF$0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
RESIDUAL STRENGTH OF ALLOYS POTENTIALLY USEFUL IN SUPERSONIC AIRCRAFT,
by I. E. Figge. Feb 65, 36p NASA-TN-D-2613
Unclassified report

Descriptors: (*Alloys, Supersonic planes).

N65-16584 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.

AN INVESTIGATION OF THE VANADIUM-GALLIUM SYSTEM BETWEEN 50 AND 100 ATOMIC PERCENT VANADIUM,
by John J. Fischer and Hubert B. Probst. Feb 65, 11p NASA-TN-D-2647
Unclassified report

Descriptors: (*Vanadium alloys, Gallium alloys), (*Gallium alloys, Vanadium alloys), Phase studies.

Patent 3,170,788 Div. 17, 20

URANIUM BASE ALLOY.
Patent assigned to AEC,
by Martin H. Binstock and Harold E. Kline. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Uranium alloys, Reactor fuel elements), (*Reactor fuel elements, Uranium alloys), Molybdenum alloys, Silicon alloys, Aluminum alloys, Patents, Creep, Tensile properties, Density, Hardness.

The alloy is used in nuclear reactor applications. The uranium base alloy contains 1.5 to 6 percent (by weight) of molybdenum, 0.2 to 1 percent silicon and aluminum and the remainder uranium.

Patent 3,170,824 Div. 17

IRON ALLOY.
Patent assigned to AEC,
by Donald B. Roach, Dimon A. Roberts, and Albert M. Hall. 23 Feb 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Steel, Ductility), Iron alloys, Manganese alloys, Nickel alloys, Carbon alloys, Heat treatment, Quenching (Cooling), Silicon alloys, Toughness, Tensile properties, Patents.

The highly ductile alloy consists of 13 to 17% (by weight) of manganese, from 7 to 11% of nickel, from 1.1 to 0.95% of carbon and up to 1% of silicon, the balance being iron.

18. Military Sciences and Operations

No Entries

19. Navigation

No Entries

20. Nuclear Physics and Nuclear Chemistry

CAPE-564 Div. 20

Lawrence Radiation Lab., Univ. of California, Berkeley.
PULSE LINE SPARK GAP II.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Radiation measurement systems, Design), Mechanical drawings.

Eight drawings are included for a spark gap contained in a pyrex housing 6 in. long. The housing is shaped so that the walls are at least 3/8 in. thick but it is not cylindrical. The largest OD is 6 1/8 in. and the smallest ID is 4 in. The end plates are 7 1/2 in. in dia. The fixed electrode is a 1/4-in. Cu rod 1 3/4 in. long contained in a 1 1/2-in. Cu tube 3 1/8 in. long and 5/16 in. thick. The opening in the hemispherical end is 3/8 in. wide. The adjustable tip is a 1 1/2-in. Cu rod 4 3/4 in. long with a hemispherical end. The spark gap is used in a pulse line. (AEC Abstract)

CAPE-1030 Div. 20, 30

Lawrence Radiation Lab., Univ. of California, Berkeley.
88 IN. CYCLOTRON.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Cyclotrons, Specifications), Nuclear physics, Instrumentation, Mechanical drawings.

Drawings (2057) are included for an 88-in., variable-energy, spiral-ridge cyclotron used in nuclear chemistry and in low energy physics research where variable-energy beams of a variety of ions are employed. The cyclotron will accelerate protons to 50 Mev, deuterons to 65 Mev, and heavier ions to corresponding energies. The radio-frequency has a range of 5.5 to 16.5 Mc/s and a working voltage of 70 kv dee to ground. Single dee construction permits operation in the third harmonic mode. The magnet has three flat hills on each pole which produce a maximum magnetic-field spiral angle of approx. 55 degrees. Pole face windings are provided for trimming the magnetic field. (AEC Abstract)

CAPE-1133 Div. 20

Oak Ridge National Lab., Tenn.
BF3 PROPORTIONAL COUNTER FOR PORTABLE SURVEY INSTRUMENT /Q-2170/.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Proportional counters, Design), (*Boron compounds, Fluorides), Health physics, Meters, Thermal neutrons, Portable, Aluminum, Mercury.

The counter is used in health physics with a Thermal Neutron Survey Meter (see CAPE-745, Thermal Neutron Survey Meter). The Al counter tube is 6 7/16 ± 1/16 in. long and is filled to 15 cm of Hg absolute pressure with 96% enriched 10BF3. The counter is designed to be used at 1200 v and has a minimum plateau of 200 v with 3% or less slope per 100 v. (AEC Abstract)

CAPE-1134 Div. 20

Oak Ridge National Lab., Tenn.
GEIGER TUBE SURVEY PROBE/Q-2152/.
Engineering Materials. Unclassified drawing

Price information available from CFSTI upon request.

Descriptors: (*Geiger counters, Design), Mechanical drawings, Aluminum, Radiation measurement systems.

The hooded, Geiger tube probe has an Al tube housing 7 3/4 in. long, 1 in. OD, and a 0.065-in. wall thickness. The cover is 4 1/4 in. long, 1 1/8 in. OD, and 0.058 in. thick. The tube is an Anton 105 G or an Amperex 90 NB. The Al tube holder is 2 1/16 in. long, 0.875 in. OD, and 0.783 in. ID. The tube socket is constructed of linen filled bakelite. It is 0.783 in. OD, 0.638 in. ID, and 7/16 in. thick. (AEC Abstract)

CAPE-1156 Div. 20

Oak Ridge National Lab., Tenn.
THERMOCOUPLE SCANNER SYSTEM FOR MSRE/Q-2574/.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors. (*Fused salts cooled reactors, Temperature control), Thermocouples, Monitors, Display systems, Signals, Mechanical drawings.

Eleven drawings are included for a scanning system that monitors and displays the signals produced by approximately 420 thermocouples in Molten-Salt Reactor Experiment channels. The system may be adjusted to produce an alarm signal when a temperature difference exceeds values from ± 50 to 300F. The system used a 100 point Hg jet switch as a commutator. The switch is driven by a 1200 rpm synchronous motor. The scanning rate is 2000 points/sec. (AEC Abstract)

CAPE-1157 Div. 20

Oak Ridge National Lab., Tenn.
NEUTRON MONITOR WITH OPTIONAL BURST DETECTOR /Q-2562/.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Dose rate, Radiation monitors), (*Neutron detectors, Radiation monitors), (*Radiation monitors, Mechanical drawings), Radiation alarms, Radiation measurement systems.

Ten drawings are included for a transistorized, a-c powered monitor used for continuous measurement of fast and thermal neutron dose rates and for immediate critical incident occurrence warning. The instrument has a single range of 0 to 25 mrem/hr indicated by a calibrated panel meter. An alarm can be manually adjusted to sound the alarm at any value in the range. Monitor output can be fed to a strip chart to record dose rate. An optional fast burst alarm operates independently of the dose rate circuitry. The fast burst response sounds and alarm when neutron bursts of 20 micro sec duration originate from critical incidents up to 200 ft from the detector. A polyethylene moderator surrounds the BF3 detector to thermalize fast neutrons. The polyethylene is covered with a 0.025-in.-thick Cd sheet to lower cut-off limit to the thermal neutrons. (AEC abstract)

CAPE-1167 Div. 20

Oak Ridge National Lab., Tenn.
BETA CALUTRON-ION SOURCES.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Ion sources, Magnetic separation), (*Magnetic separation, Ion sources), Plutonium, Uranium, Stable isotopes, Production, Mechanical drawings.

Eighteen drawings are included for M-16 ion source used in Pu separation by calutron and in uranium and stable isotope separation. The ion source may be serviced in a glove box, and is compatible with existing plutonium containment. The source is used with charges ranging from lg Pu (mixed with 17 g U) to hundreds of grams of stable isotope charge feeds. Ion output ranges from an average of 2 to 75 mA. The M-16/2 miniaturized source is used with pre-enriched feeds to obtain an increase in total recovery and process efficiency. The source is used with 10 to 100 g of charge material. (AEC Abstract)

N65-15749 Div. 20
CFSTI Prices: HC$2.00 MF$0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
CHARACTERISTICS OF A CONTINUOUS-FLOW INDUCTION PLASMA ACCELERATOR,
by J. D. Brooks, W. D. Beasley, and R. L. Barger.
Feb 65, 30p NASA TR-R-219
Unclassified report

Descriptors: (*Plasma medium, Accelerators), (*Accelerators, Plasma medium).

Patent 3,165,475 Div. 20

STRONTIUM COMPOSITION AND PROCESS OF MAKING IT.
Patent assigned to AEC,
by Lawrence C. Amos. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Radioactive isotopes, Transportation), (*Transportation, Radioactive isotopes), (*Strontum, Handling), Oxides, Carbonates, Powders, Solids, Safety, Lithuim compound, Fluorides, Mixtures, Melting, Processing, Patents, Strontium compounds.

The Sr90-containing compound is safe for shipping. Strontium oxide or strontium carbonate powders are mixed with lithium fluoride. The mixture is melted whereby a homogeneous viscous mixture is obtained. The mass is then cooled for solidification.

Patent 3,169,057 Div. 20, 4

SEPARATION OF PLUTONIUM, URANIUM AND FISSION PRODUCTS FROM EACH OTHER.
Patent assigned to AEC,
by James B. Knighton and Robert K. Steunenberg.
9 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Reactor fuel processing, Patents),

(*Plutonium, Separation), (*Uranium, Separation), (*Rare earth elements, Separation), (*Yttrium, Separation), Fission products, Oxidation, Magnesium alloys, Zinc alloys, Alkali metal compounds, Alkaline earth compounds, Magnesium compounds, Chlorides.

Lanthanides and yttrium are separated from uranium and plutonium contained as metals in neutron-bombarded uranium by introducing the uranium into a molten magnesium-zinc alloy containing at least 18 percent by weight of magnesium, adding magnesium chloride to the reaction mass and heating above the melting points. The lanthanides and yttrium are oxidized to the chlorides and taken up by the flux.

Patent 3,170,843 Div. 20

PASTE REACTOR.
Patent assigned to AEC,
by Roland Philip Hammond. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Breeder reactors, Reactor fuels), (*Reactor fuels, Breeder reactors), Uranium, Liquid metals, Reactor fuel processing, Binders, Patents.

The fast breeder reactor is for producing nuclear power. It utilizes a paste fuel of uranium-containing particles in liquid metal. Only fertile material need be supplied after initial start-up. Movement and processing of fertile and fuel materials can be done without interrupting the operation of the reactor. The system can be loaded and unloaded using a paste containing fissile element in fine particle form.

Patent 3,170,844 Div. 20

CONTROL ROD DRIVE MECHANISM.
Patent assigned to AEC,
by David Nicoll. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Control rods, Drives), (*Pneumatic systems, Control rods), Reactor system components, Reactor control, Patents, Synchros.

The control rod driving mechanism is used in a nuclear reactor. A pneumatic system is used as a basic drive while an integral and co-functioning electromechanical system provides precise positional control. The reactor coolant fluid itself is used to drive the rod.

Patent 3,170,846 Div. 20, 13

STEAM GENERATOR.
Patent assigned to AEC,
by Ben Blumberg, Jr. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Steam power plants, Nuclear reactors), (*Gas-cooled reactors, Boilers), Nuclear power plants, Boiling water reactors, Pressure vessels, Heat exchangers, Patents.

The nuclear steam generator has a gas cooled reactor with a boiler separated from the reactor by a plenum chamber. An open-ended pressure vessel surrounds the reactor and boiler and is spaced from them and has a shield plug closing one end of the vessel. Elements connected to the shield plug support the reactor. The other end of the pressure vessel is closed by a boiler tube sheet. A pump is used for circulating gas. The gas is heated in the reactor and is cooled in the boiler. Boiler feed water is directed through the boiler in heat exchange relation with the heated gas.

Patent 3,170,847 Div. 20

SELF-MODERATING FUEL ELEMENT.
Patent assigned to AEC,
by Joseph A. Dudek and Edward L. Reed. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Reactor fuel elements, Design), Reactor moderators, Reactor cores, Zirconium compounds, Hydrides, Reactor fuels, Copper alloys, Uranium compounds, Oxides, Protective coverings, Nickel, Patents.

The fuel element for a nuclear reactor has a zirconium hydride moderator core. The zirconium hydride is encompassed with a layer of copper containing uranium dioxide interspersed through it. The ratio of uranium to copper is 1 to 12. The layer of copper is covered with an outer protective layer of nickel.

Patent 3,171,025 Div. 20

LONG STRAIGHT SECTIONS FOR ALTERNATING GRADIENT SYNCHROTRONS.
Patent assigned to AEC,
by Thomas L. Collins. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Synchrotrons, Particle accelerator techniques), (*Particle accelerator techniques, Synchrotrons), Particle accelerator components, Focusing, Magnets, Lenses, Patents.

Two coaxial spaced quadrupole magnetic focusing lenses are placed coaxially around a straight tube section for receiving protons from a source and a target bombarded by the protons upstream from the first quadrupole produces secondary particles which pass through the first quadrupole at a sharp angle to the axis of the quadrupoles and clear the outside of the second quadrupole. The system utilizes the standard and well known techniques and apparatus and is highly flexible for a wide range of applications, e.g. including alternating gradient synchrotrons capable of energies from 15 to 1000 bev. or more.

21. Nuclear Propulsion

No Entries

22. Ordnance

Patent 3,165,836 Div. 22

AUXILIARY SIGHTING DEVICE FOR GRENADE LAUNCHING FIREARMS.
Patent assigned to Army,
by Robert F. Magardo. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Gun sights, Rifle grenade launchers), (*Rifle grenade launchers, Gun sights), Gun barrel attachments, Patents.

The grenade launcher is mounted on the barrel of a rifle-type firearm. It is of the high trajectory type. The launcher is rifled to spin the grenade. The rifle sight is inoperative for use with the launcher. The auxiliary sighting device is mounted on the left side of the firearm. It is mounted so that the sight line is never blocked by the launcher or a hand grasping the launcher.

Patent 3,166,612 Div. 22

PROPELLANTS AND METHOD FOR MAKING THEM.
Patent assigned to Army,
by Charles W. Sauer, Ekkehard L. Kreidl, Bessie A. Lepper, and Bruce S. Old. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Ammunition propellants, Manufacturing methods), (*Propellant grains, Manufacturing methods), Composite materials, Gels, Extrusion, Solvents, Nitrocellulose, TNT, RDX, HMX, PETN, Ethylenediamine, Nitramines, Ureides, Acrylic resins, Small arms ammunition, Patents.

The propellants are particularly suitable for small arms ammunition. The propellants have a multiplicity of discrete layers which provide distinctly different performance characteristics during the successive stages of burning. Small granules, rods or other geometrical shapes of a core material are surrounded with one or more discrete layers of material.

Patent 3,166,983 Div. 22

DIFFERENTIAL GAS SYSTEM FOR GAS-OPERATED FIREARMS.
Patent assigned to Army,
by Albert J. Lizza. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Recoil mechanisms, Automatic weapons), (*Gas cylinders, Recoil mechanisms), (*Pneumatic systems, Recoil mechanisms), Gun components, Patents.

The gas cylinder assembly for an automatic firearm has a gas piston. The piston is constructed so that its recoil movement is not initiated until the force imparted to it by the entry of the discharge gases into the cylinder is overcome by the opposing force of the gases which accumulate in front of the driving face on the piston.

Patent 3,167,013 Div. 22

DEVICE FOR ARMING AN UNDERWATER WEAPON AT SHALLOW DEPTHS.
Patent assigned to Navy,
by Robert M. Schmiech. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Arming devices, Underwater mines), (*Underwater mines, Arming devices), Aerial mines, Mine fuzes, Water, Pumps, Hydraulic actuators.

The arming of the aircraft planted shallow water mine is achieved by a motor driven water pump having the inlet thereof in communication with the ambient water within which the device is submerged and the outlet thereof in communication with a piston movable from an initial safe position to an armed position by the pressure of the water thereagainst when the pump has increased the water pressure to a predetermined value. The operation of the device is initiated by the withdrawal of an arming wire which removes a restraint from the piston when in the initial unarmed position thereof and sets the motor into operation to actuate the pump.

Patent 3,167,048 Div. 22, 6

TORPEDO AUTOPILOT SERVO.
Patent assigned to Navy,
by Clarence F. Ramstedt. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Acoustic torpedoes, Servomechanisms), (*Servomechanisms, Acoustic torpedoes), Patents, Guidance, Integrators, Circuits, Electromagnetic pulses, Electric currents, Signals.

The integrator and D.C. to A.C. converter circuit for processing periodic D.C. pulses to provide an A.C. signal is utilized in the guidance control of acoustic homing torpedoes of the echo-ranging type. The circuit operates at very-low pulse repetition frequencies, such as one pulse every several seconds, which are encountered in underwater echo-ranging systems.

Patent 3,169,333 Div. 22

PROJECTILE FOR FIRING A LEAKPROOF CASELESS ROUND.
Patent assigned to Army,
by John H. Scanlon. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Small arms ammunition, Projectiles), (*Projectiles, Small arms ammunition), Firing mechanisms, Gas seals, O-rings, Ammunition propellants, Weight, Patents.

The projectile is used in a 30 caliber rifle. A projectile is fired from the barrel. A caseless round of propellant is positioned in the rear of the projectile to be fired and a second projectile in the rear of the caseless propellant. An O-ring is positioned on the outside of the second projectile. An electric or percussion primer may be used.

Patent 3,169,443 Div. 22

PROPELLANT ACTUATED RELEASE BOLT.
Patent assigned to Army,
by Albert M. Stott. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Cartridges (PAD), Release mechanisms), (*Release mechanisms, Cartridges (PAD)), Bolts, Shear stresses, Patents.

The propellant actuated release bolt functions without the objectionable emission of the gas and without the scattering of metal fragments. The shearing action for release of the bolt occurs longitudinally of the bolt axis instead of transversely of it.

Patent 3,169,445 Div. 22, 31

MAGAZINE MECHANISM.
Patent assigned to Navy,
by Arthur J. Stanton, David F. Anderson, Richard E. Taylor, and John B. King. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Ammunition, Storage), (*Feed mechanisms, Antiaircraft guns), Gun mounts, Handling, Loading, Patents, Shipborne.

The magazine mechanism is for use in systems for antiaircraft use aboard a ship. The magazine has components at the round entry station for transferring ammunition from a loading mechanism to the magazine. Mechanical and electrical interlocks are provided.

Patent 3,169,477 Div. 22

REMOTE CONTROL DEPTH CHARGE PISTOL SETTING SYSTEM.
Patent assigned to Navy,
by Marcel E. Gres, George W. Wood, and Norman M. Schaeffer. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Arming devices, Depth charge components), (*Depth charge components, Arming devices), Remote control systems, Patents, Depth charges.

The remote control setting selector station is for setting the pistol firing mechanism of a depth charge. A system is disclosed wherein a series of setting impulses is transmitted to a depth charge pistol for presetting the depth charge to fire at a predetermined depth, and wherein additional impulses may be thereafter transmitted to the pistol to erase the setting for purposes of safety if it is decided not to launch the depth charge after setting, or, if it is desired to reset the pistol to fire at a different depth.

Patent 3,169,481 Div. 22

WATER CONFINEMENT ARMING DEVICE.
Patent assigned to Navy,
by Richard H. F. Stresau, Jr. and Warren M. Slie.
16 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Explosive trains, Arming devices), (*Arming devices, Underwater ordnance), Charges (Explosive), Underwater, Patents.

The explosive train has no moving parts and is capable of arming underwater ordnance items merely by immersion in water. The arming train includes an ignition charge, a base charge for detonating the main charge on the ordnance item, and a columnar transmission charge interconnecting the ignition charge and the base charge.

Patent 3,170,372 Div. 22

LOADER AND MAGAZINE MECHANISM.
Patent assigned to Navy,
by Arthur J. Stanton, David F. Anderson, and Richard E. Taylor. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Feed mechanisms, Antiaircraft guns), (*Loading, Antiaircraft guns), Ammunition, Projectiles, Storage, Conveyors, Patents.

The loader and magazine mechanism is for use with a gun for shipboard antiaircraft use. The projectile is enclosed in a container or case which functions as an ammunition storage case and as an expendable gun chamber when the projectile is fired. The projectiles are fed to the gun at machine gun rates of feed. The structure includes interlocking devices. A fixed magazine or conveyor stows and feeds the projectiles to a relatively movable transfer mechanism.

Patent 3,170,399 Div. 22, 8

RADIO REMOTE CONTROL MINE CIRCUIT WITH NO CURRENT DRAIN.
Patent assigned to Army,
by Wilbur S. Hinman, Jr. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Remote control systems, Radio signals), (*Electric detonators, Remote control systems), (*Mines (Ordnance), Electric detonators), Patents.

The radio control circuit is designed to detonate a mine. The circuit includes an antenna, an inductor tuned to a predetermined frequency by a capacitor, a rectifier, a diode connected to a capacitor and a detonator.

Patent 3,170,401 Div. 22

CARTRIDGE CASE.
Patent assigned to Navy,
by Walter T. Johnson and Stanley P. Prosen.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Cartridge cases, Design), Seals (Stoppers), Patents.

The cartridge case is for use in propelling a projectile from the bore of a gun. The base of the case is reuseable without resizing. A plastic obturator forms an effective seal to prevent the exploding gases to escape the breech of the gun. The base may be made of a metal such as aluminum or a plastic reinforced with glass fibers. The sidewalls may be made of a plastic, a combustible nitrocellulose construction or of a thin metallic material.

Patent 3,170,402 Div. 22

EQUAL LENGTH DETONATING CORDS FOR WARHEAD DETONATION.
Patent assigned to Navy,
by Harold S. Morton and Zanville M. Raffel. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Continuous rod warheads, Detonating cord), (*Detonating cord, Continuous rod warheads), Explosive initiators, Patents.

A system is provided for producing approximately simultaneous initiation of an explosive annulus at a multiplicity of points equally spaced along the periphery of the annulus and at one end thereof. The method and system consists of providing 'equal length' paths of shielded detonating cord from a single point of initiation of the system, with the ends of the detonating cord paths being provided with a multiplicity of points for initiation of the explosive annulus. A detonating cord is defined as a flexible (either fabric or metal) tube containing a filler of high explosive which can be set off by a blasting cap or by an electrical detonator.

Patent 3,170,403 Div. 22, 7, 12

FLYWHEEL FOR GENERATOR IN ORDNANCE MISSILE.
Patent assigned to Army,
by Lawrence B. Heilprin. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Flywheels, Generators), (*Generators, Flywheels), Ordnance, Guided missile components, Patents.

The missile has a target responsive electronic fuse and an electric generator which powers the fuse. The generator is wind driven. An inertia member is incorporated into the turbine-generator. It provides power to drive the generator when the missile is in the stratosphere.

Patent 3,170,404 Div. 22

ACCELERATION SENSITIVE VARIABLE CLOCK.
Patent assigned to Army,
by Frank H. Swaim and Arthur Hausner. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Arming devices, Clock delay mechanisms), (*Clock delay mechanisms, Arming devices), Projectile fuzes, Safety devices, Acceleration, Sensitivity, Patents.

A mechanical clock provides variable delayed arming for ordnance projectile fuses. The clock mechanism, including shafts and springs, is associated with a shaft mounted fuse arming rotor. The clock is adapted to store an amount of energy proportional to the setback force developed.

Patent 3,170,431 Div. 22

TORPEDO ENABLING SYSTEM.
Patent assigned to Navy,
by Herbert D. Norviel. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Acoustic torpedoes, Safety devices), Electronic equipment, Circuits, Heaters, Fire control systems, Patents.

The acoustic homing torpedo is adapted to have various electrical components therein energized, while the torpedo is in a launching tube and during a warm-up period of operation, by a warm up circuit contained in the torpedo and connected through a control cable extending to the torpedo from an externally-located warm up switch and battery. Elements are provided which prevent the torpedo from premature exploding.

Patent 3,170,738 Div. 22

ROTATABLE MOUNTING STRUCTURE WITH MECHANICAL LOCKING BLIND BOLT.
Patent assigned to Army,
by Clarence H. Winfree. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Gun mounts, Fastenings), (*Fastenings, Gun mounts), Shafts, Bolts, Rotation, Journal bearings, Thrust bearings, Automatic weapons, Small arms, Patents.

A separable pivotal mounting structure is provided for securing a first and a second rotatable member in journal-thrust bearing relationship. A machine gun may be employed alternately in the instant mount or on an emergency tripod without the use of any additional special fittings.

23. Personnel and Training

No Entries

24. Photography and Other Reproduction Processes

Patent 3,169,064 Div. 24

HEAT ERASABLE PHOTOSENSITIVE COATING AND PROCESS OF USING SAME.
Patent assigned to Army,
by Marilyn Levy. 9 Feb 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Photographic recording media, Photosensitivity), (*Photosensitivity, Optical coatings), (*Optical coatings, Photosensitivity), Patents, Heat, Disposal, Photographic plates, Optical images, Photographic images, Acetal plastics, Ultraviolet optical materials.

Photographic recording is accomplished by preparing a direct-printing-out photo-sensitive coating containing phosphotungstic acid and polyvinyl butyral, applying the coating to a support to provide a printing plate, exposing the coating to an ultraviolet image, utilizing the image thus printed upon the sensitive printing element, and erasing the printed image by applying heat.

Patent 3,170,793 Div. 24

PHOTOGRAPHIC FIXING BATH.
Patent assigned to Army,
by Marilyn Levy. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Photographic chemicals, Photographic emulsions), Silver compounds, Halides, Sodium compounds, Thiosulfates, Sulfites, Aluminum compounds, Fotassium compounds, Sulfates, Colloids, Silicon compounds, Dioxides, Patents.

The fixing bath has any desired composition of chemicals including sodium thiosulphate as the main dissolving agent for the undeveloped silver halide in the sensitive emulsion. The bath may also include control chemicals such as acetic acid, sodium sulphite and a hardener such as potassium alum. A quantity of collodial silica is dispersed in the composition to complete the formulation.

25. Physics

N65-14531 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Massachusetts Inst. of Tech., Cambridge.
COHERENTLY DRIVEN MOLLECULAR VIBRATIONS AND LIGHT MODULATIONS,
by E. Garmire, F. Pandarese, and C. H. Townes.
1964, 9p
Grant NsG330
NASA CR-58211

Unclassified report

Descriptors: (*Molecular spectroscopy, Coherent scattering), (*Light, Modulation), Excitation, Raman spectroscopy.

N65-14560 Div. 25, 9
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL LOCAL HEAT-TRANSFER DATA FOR PRECOOLED HYDROGEN AND HELIUM AT SURFACE TEMPERATURES UP TO 5300 DEGREES R,
by Maynard F. Taylor. Jan 65, 23p
Rept. no. NASA TN D-2595

Unclassified report

Descriptors: (*Hydrogen, Heat transfer), (*Helium, Heat transfer), Experimental data.

N65-14630 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
USE OF TEMPERATURE BUFFERED ARGON ARC IN SPECTROGRAPHIC TRACE ANALYSIS,
by William A. Gordon. Jan 65, 20p
NASA-TN-D-2598

Unclassified report

Descriptors: (*Argon, Electric arcs), (*Tracer studies, Spectroscopy).

N65-14631 Div. 25, 30
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
STRESS-INTENSITY FACTORS FOR SINGLE-EDGE-NOTCH SPECIMENS IN BENDING OR COMBINED BENDING AND TENSION BY BOUNDARY COLLOCATION OF A STRESS FUNCTION,
by Bernard Gross and John E. Srawley.
Jan 65, 18p NASA-TN-D-2603

Unclassified report

Descriptors: (*Beams (Structural), Stresses), (*Test methods, Stresses).

N65-15530 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
DISTORTION OF ATOMIC-BEAM VELOCITY DISTRIBUTIONS DUE TO CLASSICAL HARD-SPHERE GAS SCATTERING,
by Eugene J. Manista. Jan 65, 23p
Rept. no. NASA TN D-2617

Unclassified report

Descriptors: (*Particle beams, Scattering), (*Cesium, Particle beams), Gases.

N65-15626 Div. 25, 12
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
BEHAVIOR OF LIQUID-VAPOR INTERFACE OF CRYOGENIC LIQUIDS DURING WEIGHTLESSNESS,
by Clifford E. Siegert, Donald A. Petrash, and Edward W. Otto. Feb 65, 14p
Rept. no. NASA TN D-2658

Unclassified report

Descriptors: (*Liquefied gases, Weightlessness), (*Cryogenics, Weightlessness).

N65-16583 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Drexel Inst. of Tech., Philadelphia, Pa.

PROPAGATION OF CYLINDRICAL AND SPHERICAL ELASTIC WAVES BY METHOD OF CHARACTERISTICS,
by Pei Chi Chou and Herbert Abraham Koenig.
Feb 65, 69p
Grant NsG270 63
NASA TN-D-2644

Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Elasticity, Mechanical waves), Numerical methods and procedures.

PB-166 821 Div. 25, 8
CFSTI Prices: HC$1.00 MF$0.50

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE,
by C. M. Bliven, J. V. Florio, and T. G. Polyani.
31 Aug 63, 24p Rept. nos. TR-63-255.5, SR-5
Contract AF19 628 331, Proj. 5634, Task 563405
AFCRL 63 372; AD 420 250

Unclassified report

Descriptors: (*Nitrogen, Adsorption), (*Oxygen, Adsorption), (*Tungsten, Adsorption), (*Molybdenum, Adsorption), Gases, Solids, Surface properties, Vacuum, Mass spectrum, Electron tube heaters, Cathodes (Electron tubes), Anodes (Electron tubes), Semiconductors, Photoelectric effect, Thermionic emission, Field emission.

Experimental data on the adsorption of nitrogen on tungsten were obtained. The data were analyzed and the sticking probability was obtained from consideration of the mass-balance relationship in the reaction chamber. The chemical pumping speeds of the omegatron filament and oxide cathode assembly due to reactions with the incoming oxygen were estimated. The sticking probability and number of adsorbed molecules of oxygen on the molybdenum anode were calculated from the pressure-time characteristic. (Author)

26. Production and Management

CAPE-1166 Div. 26

Du Pont de Nemours (E. I.) and Co., Savannah River Lab., Aiken, S. C.
FOUR-DIE SWAGER NOISE-REDUCING ENCLOSURE.
Engineering Materials.

Unclassified drawing

Price information available from CFSTI upon request.

Descriptors: (*Acoustic insulation, Mechanical drawings), (*Presses (Machinery), Acoustic insulation), Glass textiles, Containers, Steel, Sheets.

Five drawings are included. The enclosure consists of a fiberglass insulated box isolated from the floor and swager. The box has double front and rear doors and soundproof openings for feed and exit of materials to be swaged. Side walls are built from normal construction materials. Top and sides are sectionalized to facilitate easy disassembly for decontamination. Interior wall and ceiling linings adjacent to the loading doors are fabricated of solid sheet steel to prevent oil (thrown from the dies) from penetrating the insulation between the exterior and interior walls. The rear half of the interior walls and ceiling is fabricated from perforated sheet steel. The enclosure reduces the over-all frequency band level of 119 to 90 decibels. (AEC Abstract)

Patent 3,165,922 Div. 26, 17, 30

METHOD OF APPLYING LAMB WAVES IN ULTRASONIC TESTING.
Patent assigned to AEC,
by Daniel C. Worlton. 19 Jan 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Non-destructive testing, Metal plates), (*Ultrasonic radiation, Non-destructive testing), Test methods, Patents.

Subsurface flaws in a metal sample are detected by generating ultrasonic plane waves, refracting these waves to generate a spectrum of angles and causing the waves to impinge on the surface of the sample. The waves excite Lamb wave modes within the samples in the presence of flaws. The Lamb wave modes are detected to locate the flaws.

Patent 3,169,775 Div. 26, 8

MULTI-BEARING SEAL FOR ROTATABLE ELEMENTS.
Patent assigned to Navy,
by Francis L. Macaluso. 16 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Antenna feeds, Seals (Stoppers)), (*Seals, (Stoppers), Antenna feeds), Bearings, Rotation, Friction, Patents.

The seal restricts the flow of fluids between the outside of a shaft and the inside of a shaft housing, such as the rotating feed horn and a feed horn base of an antenna installation. The seal has a plurality of pairs of bearing surfaces which successively share the frictional load between the rotatable parts of the seal.

Patent 3,170,234 Div. 26

JOINTING OF REFRACTORY METALS BY SOLID-STATE DIFFUSION BONDING.
Patent assigned to AEC,
by Charles O. Tarr. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Refractory metals, Diffusion bonding), (*Duffusion bonding, Refractory metals), Tungsten, Molybdenum, Niobium, Controlled atmospheres, Surface properties.

The refractory metals, such as tungsten, molybdenum and columbium, are used in the nuclear energy and space fields. The metals are jointed by bringing oxide-free surfaces of the metals into contact under a protective atmosphere at about 1350 C. and below the melting point of the lowest-melting metal. A minimal pressure across the interface is required by solid-stage diffusion bonding.

Patent 3,170,720 Div. 26

FLEXIBLE CONDUIT FOR PIPING AND THE LIKE.
Patent assigned to Navy,
by Harold Browning. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Pipe fittings, Flexible couplings), (*Flexible couplings, Pipe fittings), High-pressure research, Patents.

The flexible pipe couplings are useful in high pressure systems. A plurality of cylindrical metallic elements are joined together with a plurality of resilient cylindrical members to form a series of alternate metallic and resilient elements. The end elements of the coupling are provided with devices for fastening the coupling to other pipe sections. The series combination of metallic elements and resilient members is provided with metallic restraining devices for preventing the elements from pulling apart under pressure.

PB-166 811 Div. 26
CFSTI Prices: HC$2.00 MF$0.50

Department of Commerce, Washington, D. C. Panel on Engineering and Commodity Standards.
REPORT OF THE PANEL ON ENGINEERING AND COMMODITY STANDARDS OF THE COMMERCE TECHNICAL ADVISORY BOARD TO THE ASSISTANT SECRETARY FOR SCIENCE AND TECHNOLOGY, U. S. DEPARTMENT OF COMMERCE. SECTION A.
2 Feb 65, 45p

Unclassified report

This rept. has been divided into two sections.

Descriptors: (*Standards, United States Government), (*Commerce, Standardization), Measurement, Industrial production, Production, Specifications, Construction, Management engineering, Scientific research, Operations research, Materials, Industries, Law, Professional personnel, Civilian personnel, Reports.

PB-166 812 Div. 26
CFSTI Prices: HC$6.00 MF$1.50

Department of Commerce, Washington, D. C. Panel on Engineering and Commodity Standards.
REPORT OF THE PANEL ON ENGINEERING AND COMMODITY STANDARDS OF THE COMMERCE TECHNICAL ADVISORY BOARD TO THE ASSISTANT SECRETARY FOR SCIENCE AND TECHNOLOGY, U. S. DEPARTMENT OF COMMERCE. SECTION B.
2 Feb 65, 253p

Unclassified report

This rept. has been divided into two sections.
See also PB-166 811.

Descriptors: (*Standards, United States Government), (*Commerce, Standardization), Measurement, Industrial production, Production, Specifications, Construction, Scientific research, Operations research, Materials, Industries, Law, Professional personnel, Reports.

Late in 1958 the National Academy of Sciences established an ad hoc committee to evaluate the operations and functions of the Department of Commerce in the fields of science and technology. Among the areas studied were the Commodity Standards Division of the Office of Technical Services and its relationship to the over-all standards activities in the United States, including the American Standards Association and its supporting member-bodies. The committee's report was submitted in March 1960. With reference to standards activities, the report concluded that there are so many groups issuing and promulgating standards that the United States, in reality, has no national standards program. The report-recommended specifically 'that the Secretary of Commerce take the leadership in initiating another study of standardization in the United States by an appropriately constituted body for the purpose of strengthening and unifying the standards and simplified practices program of the nation'. Acting on the recommendation of the Kelly Committee, Assistant Secretary of Commerce, J. Herbert Hollomon, established a new ad hoc committee to further examine the problems and make recommendations for a national standards program.

PB-166 835 Div. 26, 30
CFSTI Prices: HC$3.00 MF$0.75

General Electric Co., Cincinnati, Ohio. Materials Development Lab. Operation.
THE DEVELOPMENT OF METHODS FOR THE ULTRASONIC INSPECTION OF BEARINGS.
Final engineering rept. for Mar 63-Sep 64,
by E. N. Bamberger and J. D. Marble. 20 Oct 64,
89p
Contract NOw63 0383d
AD 454 013

Unclassified report

Descriptors: (*Ball bearings, Non-destructive testing), (*Non-destructive testing, Ultrasonic radiation), Quality control, Failure (Mechanics), Statistical analysis, Experimental data, Test methods, Test equipment, Transducers, Bearing, Reliability.

The special Ultrasonic Inspection technique coded MC sub 3 is particularly suited for bearing inspection, due to the ability to control its depth of scan, thereby restricting the inspected region. In this manner, inspection can be concentrated on the segment of the raceway which experiences the major sub-surface shear stresses during bearing operation. Using the MC sub 3 technique, the inner and outer raceways of 100 ball bearings were inspected prior to assembly. The inspection data was analyzed and the bearings were ranked in order of probability of failure. Following testing, a re-inspection was performed on a number of long-life, unfailed bearings in order to determine whether the MC sub 3 inspection could also detect incipient sub-surface failures. A statistical analysis of the test data shows that the MC sub 3 inspection is capable of sorting out those bearings which are likely to fail in the early portion of life. It cannot as yet, however, do this on a completely reliable basis. MC sub 3 inspection presently also tends to reject some bearings with long potential. Until, the reliability can be more absolute, the MC sub 3 method cannot be recommended for immediate application as a quality control measure. Means to improve reliability are being developed and these are discussed. (Author)

27. Propulsion Systems

N65-15533 Div. 27, 12
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.

EVALUATION OF 40-MILLIMETER-BORE BALL BEARINGS OPERATING IN LIQUID OXYGEN AT DN VALUES TO 1.2 MILLION,
by Robert E. Cunningham and William J. Anderson.
Jan 65, 23p NASA-TN-D-2637
Unclassified report

Descriptors: (*Ball bearings, Cryogenics), Liquified gases.

N65-15747 Div. 27
CFSTI Prices: HC$1.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL INVESTIGATION OF A 3.0-INCH-MEAN-DIAMETER FULL-ADMISSION THREE-STAGE TURBINE SUITABLE FOR SMALL AUXILIARY POWER UNITS,
by Robert Y. Wong and William J. Nusbaum.
Feb 65, 24p Rept. no. NASA TN D-2639
Unclassified report

Descriptors: (*Gas turbines, Auxilary power plants), (*Auxilary power plants, Gas turbines).

N65-15944 Div. 27
CFSTI Prices: HC$2.00 MF$0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
OFF-DESIGN PERFORMANCE PREDICTION WITH EXPERIMENTAL VERIFICATION FOR A RADIAL-INFLOW TURBINE,
by Samuel M. Futral, Jr. and Charles A. Wasserbauer.
Feb 65, 29p NASA-TN-D-2621
Unclassified report

Descriptors: (*Gas turbines, Performance (Engineering)).

Patent 3,169,613 Div. 27

ELASTIC UNIVERSAL JOINT.
Patent assigned to NASA,
by Edwin Y. Chow and Robert M. Bamford. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Universal joints, Rocket motors), Mounting brackets, Supports, Elasticity, Guidance, Patents.

The elastic universal joint is adapted for the mounting of a rocket motor in a supporting structure to permit limited angular displacement of the rocket motor in order to effect guidance of a rocket vehicle. Flexure plates are utilized which are in axially overlapping relation to provide an axially compact universal joint which allows the rocket motor to move about two mutually perpendicular axes.

Patent 3,170,288 Div. 27, 14

NOZZLE SEAL.
Patent assigned to Navy,
by Salvatore J. Penza and Frederick L. Haake.
23 Feb 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Rocket motor nozzles, Rubber seals), (*Rubber seals, Rocket motor nozzles), Inflatable structures.

The seal closes the nozzle of a jet propulsion engine prior to its operation. The seal is in the form of an inflatable bag which engages around the interior surface of the nozzle. The bag is made of rubber and is destructible by the exhaust gases that are discharged from the nozzle upon firing.

Patent 3,170,289 Div. 27

LIGHTWEIGHT REFRACTORY METAL STRUCTURE.
Patent assigned to Navy,
by Bruce E. Kramer. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Rocket motor nozzles, Refractory metals), (*Refractory metals, Rocket motor nozzles), Tantalum, Tungsten, Refractory coatings, Hafnium compounds, Carbides, Tantalum compounds, Sheets, Ceramic materials, Plastics, Weight, Refractory materials, Structural shells.

The rocket nozzle is constructed of refractory metals such as tantalum and tungsten. An inner liner is composed of longitudinal strips of one of the metals. A coating of a metal such as tungsten, hafnium carbide and tantalum carbide is sprayed onto the inner liner. A corrugated sheet of tungsten or tantalum is positioned between the inner liner and an outer liner of metal. The spaces between the corrugations and the outside liner are filled with a ceramic or plastic.

Patent 3,170,294 Div. 27, 1

OXYGEN INJECTION SYSTEM.
Patent assigned to Navy,
by Robert E. Meyer and William E. Helfrich.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Oxygen, Fuel injectors), (*Fuel injectors, Oxygen), Afterburners, Ramjet engines, Flameholders, Patents.

The oxygen injection system is for afterburners and ramjets which employs a particular type of flameholder structure for assisting in the distribution of oxygen. The design of the concentric flameholders is such that only a single oxygen line is required to supply oxygen to the flameholders.

Patent 3,170,295 Div. 27, 10

PROPELLANT TANK PRESSURIZATION SYSTEM.
Patent assigned to NASA,
by Marshall A. Appel and Donald F. Weitzel.
23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Fuel systems, Rocket motors), (*Pressure vessels, Propellant tanks), (*Propellant tanks, Pressure).

A method and apparatus are provided for pressurizing propellant tanks used in the feed system of a propulsion motor. The propellants themselves are used to pressurize the propellant tanks, thereby eliminating the need for extra pressurant containers and accompanying equipment.

28. Psychology and Human Engineering

N65-14848 Div. 28
CFSTI Prices: HC$5.00 MF$1.00

TRW Space Technology Labs., Redondo Beach, Calif.
A STUDY OF MODEL MATCHING TECHNIQUES FOR THE DETERMINATION OF PARAMETERS IN HUMAN PILOT MODELS,
by G. A. Bekey, H. F. Meissinger, and R. E. Rose.
Jan 65, 171p
Contract NAS1 2582
NASA CR-143

Unclassified report

Descriptors: (*Mathematical models, Pilots), (*Pilots, Mathematical models), Performance (Human).

N65-15546 Div. 28, 16
CFSTI Prices: HC$2.00 MF$0.50

Lafayette Clinic, Detroit, Mich.
DEVELOPMENT OF A SELECTION TEST FOR MOTIVATIONAL APTITUDE,
by A. F. Ax, P. G. S. Beckett, N. A. Fretz, and J. S. Gottlieb. Jan 65, 50p
Contract NAS2 1031
NASA CR-156

Unclassified report

Descriptors: (*Astronauts, Selection), (*Motivation, Test construction (Psychology)).

29. Quartermaster Equipment and Supplies

Patent 3,169,564 Div. 29

PROCESS FOR PEELING WAXY FRUIT.
Patent assigned to Agriculture,
by Winfred O. Harrington and Claude H. Hills.
16 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Fruits, Processing), Waxes, Solvents, Preparation, Patents.

Waxy skinned fruits, such as apples, are peeled by contacting the fruit with a wax solvent and a lye solution. In one embodiment, the wax solvent is combined with the lye solution and dewaxing occurs in conjunction with digestion of the peel or skin.

Patent 3,170,799 Div. 29

PROCESS OF PREPARING STABLE TRIGLYCERIDES OF FAT FORMING ACIDS.
Patent assigned to Agriculture,
by Reuben O. Feuge and Werner Landmann. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Fatty acids, Stabilization), Food, Fats, Processing, Melting, Patents.

The process is for producing the thermodynamically stable polymorphic form of solid fatty triglycerides. The triglyceride mixture at a temperature below the melting point and at a pressure of at least 1000 p.s.i. is forced through an orifice about .01 inch in diameter. The products are useful in preparing chocolate used for coating candy and in preparing shortenings.

Patent 3,170,803 Div. 29

PREPARATION OF DEHYDRATED FOOD PRODUCTS.
Patent assigned to Agriculture,
by Arthur I. Morgan, Jr., and Sigmund Schwimmer.
23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Dehydrated foods, Preparation), Taste, Mixtures, Enzymes, Fruits, Vegetables, Meat, Fishes, Patents.

Dehydrated foods of improved flavor are prepared by dehydrating a food with the application of enzyme-destructive heating, dehydrating a food in the absence of enzyme-destructive heating and admixing a major proportion of the product of the first dehydration with a minor proportion of dehydrated food of the second group. Fruits, vegetables, meats, fish and other foods may be prepared using the process.

Patent 3,170,804 Div. 29

PREPARATION OF DRIED EGG WHITE.
Patent assigned to Agriculture,
by Leo Kline, Takashi Sugihara, and John J. Meehan.
23 Feb 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Dehydrated foods, Eggs), (*Eggs, Dehydrated foods), Carbohydrates, Additives, Ph, Preparation, Patents.

Dried egg white products are prepared from egg whites containing its natural complement of sugars. A water-soluble carbohydrate in an amount of 5 to 20 percent by weight and an edible acid to provide a pH of from 6 to 8 are added to the product. The egg white is then dried.

30. Research and Research Equipment

CAPE-1081 Div. 30

Oak Ridge National Lab., Tenn.
REGULATED POSITIVE POWER SUPPLY/Q-2517/.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Power supplies, Monitors), Instrumentation, Temperature, Mechanical drawings.

Two drawings are included for a power supply consisting of a 24-v card with a 100-ma rating. A 30-v a-c source must be used with the 3 x 5 in. card. The supply rectifies, filters, and regulates monitoring type instruments and is used with instruments not requireing close regulation or temperature compensation. (AEC Abstract)

CAPE-1145 Div. 30

Oak Ridge National Lab., Tenn.
TURBINE FLOW METER /Q-1718/.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Flowmeters, Liquid metals), (*Liquid metals, Flowmeters), Fluxes (Fusion), Salts, Temperature.

The turbine-type meter is used to measure the flow of liquid metals or fused salt at high temperatures. The device requires little maintenance and is only slightly dependent upon temperature over its usable range to 1500F. No external piping is needed. (AEC Abstract)

N65-15529 Div. 30, 12
CFSTI Prices: HC$1.00 MF$0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SOLAR SIMULATION TESTING OF AN EARTH SATELLITE AT GODDARD SPACE FLIGHT CENTER,
by R. E. Bernier, R. H. Hoffman, A. R. Timmins, and E. I. Powers. Jan 65, 19p NASA-TN-D-2614
Unclassified report

Descriptors: (*Solar radiation, Simulation), (*Satellites (Artificial), Test facilities).

Patent 3,165,924 Div. 30, 14, 27

NOZZLE MATERIAL FIRING EVALUATION MEANS AND SYSTEM.
Patent assigned to Air Force,
by Harry Wolff. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Captive tests, Test equipment), (*Test equipment, Rocket motor nozzles), (*Materials, Rocket motor nozzles), (*Nozzles, Materials), Combustion chambers, Test methods, Jet engines, Rocket motors (Solid propellant), Ablation, Performance (Engineering), Solid rocket propellants.

The testing device is for material which goes into the manufacture of rockets and jet motors. The sample is compared with a standard of known material to establish an accurate comparison. A combustion chamber is provided for the sample nozzle and standard nozzle. A solid propellant fuel is used to heat the sample and the standard.

Patent 3,169,819 Div. 30

DATA RECORDING SYSTEM.
Patent assigned to Navy,
by William I. Valentine and James W. Banham, Jr.
16 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Electronic recording systems, Data storage devices), Voltage, Transducers, Amplifiers, Patents.

The recording system includes scanning apparatus which is operated at a selected, or predetermined rate, to check voltages which are transmitted by transducers from the operation of an apparatus or process. A recording chart is operated synchronously with the scanning apparatus and a plurality of scribers or markers are provided to effect a recording of the value of each of the transmitted voltages. Electrical equipment, including a pair of cooperating amplifiers, is provided in the system and functions to limit each scribing operation to a time period which is proportional to the transmitted input voltage from each transducer.

Patent 3,170,068 Div. 30, 2, 25

SPHERICAL CHAMBER FOR MEASUREMENT OF VISIBILITY.
Patent assigned to Army,
by Andrew Petriw and Helmut Weickmann. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Meters, Visibility), (*Visibility, Atmosphere), Scattering, Aerosols, Light, Attenuation, Atmospheric refraction, Measurement, Portable, Patents.

The total light scattering coefficient of the atmosphere is measured by omnidirectionally illuminating an atmospheric sample by a brief intense flash of light and measuring the intensity of light scattered in one direction. The device is portable.

Patent 3,170,320 Div. 30

VIBRATION TRANSDUCER.
Patent assigned to Army,
by Robert E. Talmo. 23 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Vibration, Test equipment), (*Test equipment, Vibration), (*Transducers, Test equipment), Measurement, Conductivity, Semiconductors, Patents.

The vibration transducer is capable of measuring vibrations over a wide range of frequencies. The structure includes a U-shaped frame, a thin flat spring clamped across the open end of the frame, a pair of posts connected to the posts, a pair of spaced parallel filaments of semiconductor material connecting the bottoms of the posts and an arrangement for determining the difference in conductivity between the upper and lower filaments due to distortion of the filaments by deflection of the spring.

Patent 3,170,321 Div. 30

FATIGUE TESTING MACHINE.
Patent assigned to Navy,
by Vincent E. Sullivan and Rich L. Waterman.
23 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Fatigue (Mechanics), Test equipment), (*Test equipment, Fatigue (Mechanics)), Stresses, Patents.

A clamp is provided for use in conjunction with a structural bending-type fatigue testing machine. It applies cyclic bending to the member and at the same time allows expansion of the member relative to the clamp due to the heat generated in the specimen during bending. The clamp does not place torsional stresses on the test specimen.

Patent 3,170,326 Div. 30

HIGH PRESSURE FLUID LEVEL GAGE.
Patent assigned to Navy,
by Forrest E. Knecht. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Liquid level gages, Pressure gages), (*Pressure gages, Liquid level gages), Tanks (Containers), Fluids, Gases, High-pressure research, Hydraulic systems, Patents.

The gauge indicates the level of a liquid in a tank with a pressurized gas above it. The gauge is attached to the tank by a pair of vertically spaced, horizontal conduits for indicating the liquid level or interface between the fluids. The gauge is for use with fluids under high pressure and is constructed to give a better sealing effect with increased pressure.

Patent 3,171,037 Div. 30, 8

SEMICONDUCTOR BISTABLE CIRCUIT WITH INTEGRAL GATE.
Patent assigned to AEC,
by Wolfgang J. Poppelbaum and Neil E. Wiseman.
23 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Computer logic, Semiconductor devices), Gates (Circuits), Transistors, Amplifiers.

The memory circuit is for use in computers, counters, and shifting registers. The flipflop circuit is integral with its gate. The circuit includes a first transistor, an 'OR' gate, a first difference amplifier, a second transistor, a second difference amplifier, a source of gating voltage, voltage sources and output terminals coupled to respective sides of the flipflop for indicating the state thereof.

Patent 3,171,038 Div. 30, 8

FAST HIGH CURRENT DRIVER USING TUNNEL DIODES.
Patent assigned to Navy,
by James C. Miller. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Switching circuits, Digital computers), (*Tunnel diodes, Switching circuits), Input-output devices, Trigger circuits, Patents.

The circuit is for use in high speed digital computers. The circuit for tunnel diodes includes at least three tunnel diodes able to switch between two stable states connected in series between an input terminal and an output terminal and other components. The circuit requires only a single triggering pulse.

Patent 3,171,060 Div. 30, 12, 27

PLASMA ACCELERATOR.
Patent assigned to NASA,
by George P. Wood, Arlen F. Carter, and Adolf Busemann.
23 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Plasma medium, Linear accelerators), (*Linear accelerators, Plasma medium), Space propulsion, Test equipment, Aerodynamic characteristics, Crossed field devices, Fluid flow, Patents.

The accelerator has potential applications in aerodynamic testing, as a source of high-speed plasma for research and as a propulsion system for space vehicles. The accelerator is capable of steady flow operation. The arrangement includes an accelerating channel having crossed electric and magnetic fields. The fields are oriented normally to each other, and the charged particles of the plasma flowing through the channel are accelerated by a force calculable from the Lorentz equation.

Patent 3,171,081 Div. 30

IONIZATION VACUUM GAUGE.
Patent assigned to NASA,
by Donald C. Garwood. 23 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Meters, Vacuum), Patents, Ionization.

The ionization vacuum gauge can be mounted to have access to a vacuum to be measured. The structure includes an outer cylinder which surrounds a centrally disposed electrode or inner cylinder. The outer cylinder has its length at least equal to its inner diameter or longer. The central cylinder extends the length of the outer cylinder. One of the end plates usually found in an

ionization vacuum gauge may be omitted. The omission of one end plate affords easier access of the cylinders to the vacuum to be measured than when two end plates are employed. The electrical connections of the cylinders and end plates are such that any current flowing from the end plate as a result of a loss of electrons will not be indicated on the microammeter which is employed with the gauge.

PB-166 846 Div. 30, 9
CFSTI Prices: HC$4.00 MF$0.75

Michigan Univ., Ann Arbor. Coll. of Engineering.
ULTRASONIC-INDUCED CAVITATION STUDIES,
by R. Garcia and F. G. Hammitt. Oct 64, 109p
Technical rept. no. TR-1, rept. no. 05031-1-T
Grant NSF G22529

Unclassified report

Descriptors: (*Cavitation, Damage), (*Vibration, Test equipment), (*Test facilities, High-temperature research), Ultrasonic radiation, Piezoelectric crystals, Transducers, Thermocouples, Feasibility studies, Tests, Fluids, Density, Bubbles, Shock waves, Damage control, Steel, Stainless steel, Aluminum, Tantalum alloys, Tungsten alloys, Hafnium alloys, Molybdenum alloys, Titanium alloys, Acrylic resins, Copper, Copper alloys, Zinc alloys, Nickel alloys, Lead alloys, Bismuth alloys, Mercury.

Various accelerated cavitation damage devices for laboratory testing programs are considered, and a vibratory device utilizing a piezoelectric crystal is found to be feasible for the studies planned. Test specimens of various materials are attached to the ultrasonic transducer and vibrated at a frequency of approximately 20 Kc/sec. and with a maximum amplitude of 2.75 mils. A severe cavitation cloud is produced in close proximity to the test specimen. When the bubbles collapse, they give rise to shock waves, many of which terminate on the test specimen. Varying amounts of damage are produced in a relatively short period of time. The ultrasonic device was tested and calibrated using fluids ranging from water to mercury, thus encompassing a wide range of fluid densities. Various test specimen materials were subjected to the accelerated cavitation. A high-temperature facility was designed and built, consisting of a stainless steel containment vessel, transfer and purification systems, furnace, temperature controller, indicating thermocouples, and other associated equipment.

PB-166 860 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Control Instrument Co., Inc., Brooklyn, N. Y.
BURROUGHS-CONTROL CORPORATION: TYPED PAGE READER,
by Leon Mintz and Kenneth Brooks. 15 Jan 62, 8p

Unclassified report

Also included in Optical Character Recognition, ed. by G. L. Fischer, Jr., and others, and pub. by Spartan Books, Washington, D. C., 1962, p. 85-92.

Descriptors: (*Reading machines, Optical equipment), (*Character recognition, Optical equipment), Typewriters, Reports, Teletype systems, Signals, Lenses, Scanning, Phototubes, Video signals, Pattern recognition.

A reading machine was delivered to the U. S. Army Signal Research and Development Agency, Fort Monmouth, N. J., in January 1960 having the following features: automatic document handling, line registration, and insertion of teletype operational signals; line skew following; recognition of upper-case Standard Elite type; keyboard insertion of 'can't-read' characters; reading rate of 75 characters/sec; and output rates up to 75 characters/second. When a character cannot be read, a 'can't read' signal is produced, allowing manual insertion of the character through a console keyboard. The camera unit has a lens assembly, flying-spot scanner tube, and phototubes with associated amplifiers. The camera is positioned for proper scanning by a registration control circuit with its 'character-bottom' sensing. The video signals generated by the camera in scanning are processed in an input circuit to produce signals with small irregularities and noise removed. Each character is defined by a pattern of 96 black or white points in a matrix or grid.

PB-166 866 Div. 30, 32
CFSTI Prices: HC$1.00 MF$0.50

Scientific Documentation Centre, Dunfermline (Scotland).
RECORDING ADVANCES OF SCIENCE,
by P. S. Davison. 1961, 5p

Unclassified report

Pub. in Scotsman (Edinburgh) Aug 24 1961.

Descriptors: (*Scientific personnel, Great Britain), (*Scientific research, Documentation), (*Documentation, Scientific research), USSR, Universities.

This article aims to show how perilously short of scientists is the United Kingdom in comparison with other major industrial countries: how vigorous and extensive is the training of scientists in other countries, for example, Russia: and how studies of the working day of large groups of scientists have shown their principal activity not to be in the laboratory working with apparatus, but in communication-seeking and giving results of earlier research. Improvement of the ways of searching scientific records offers the way to potential savings of routing uncreative scientific effort of a very high order indeed. That the need for scientists exceeds the supply can be confirmed by a glance at the situations vacant page of this or any other national newspaper or scientific journal. The reason why this need faces the United Kingdom with an urgent and grave problem lies in the increasing use of scientists in industry in the other major manufacturing countries of the world. (Author)

PB-166 920 Div. 30, 13
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
PRESSURE LOSSES OF VENTILATION FITTINGS.
Design Data Sheet.
22 Jul 50, 20p DDS3801-2

Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Cooling and ventilating equipment, Ships), Pressure, Ventilation ducts, Specifications, Watertight fittings, Venturi tubes, Heaters, Flame arresters, Graphics, Data, Navy.

31. Ships and Marine Equipment

Patent 3,165,205 Div. 31, 12

APPARATUS FOR MODULAR MISSILE STOWAGE.
Patent assigned to Navy,
by Russell E. Travis, Jr. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Guided missiles, Storage), Mounting brackets, Supports, Hoists, Ships, Patents, Shipborne.

The modular stowage compartment and apparatus is especially adapted to handle missiles that vary considerably in design and size. The apparatus is for ship use. The apparatus includes stanchions and missile supporting brackets that are mounted on the stanchions. A conventional hoist and track mechanism is used for moving the missiles.

Patent 3,167,339 Div. 31, 22

MAGAZINE DOOR ASSEMBLY.
Patent assigned to Navy,
by William M. Magers and Palmer G. Wermager.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Hatches, Ammunition), Ships, Cams, Fastenings, Automatic, Actuators.

The armament magazine hatchway door assembly is for use on ships. The doors are thirty feet or more in length. A hydraulically operated, automatically sequenced, series of safety and cam latches and door latches are provided for the opening the hinged fluid tight doors. A fixed deck-mounted actuator is provided. (Author)

Patent 3,167,361 Div. 31

ROTATING BEARING.
Patent assigned to Navy,
by Ralph B. Snapp and Watt V. Smith. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Bearings, Rotation), (*Propellers (Marine), Bearings), Bronze, Rubber, Lubrication, Shafts.

The fluid lubricated bearing is for use with counter rotating shafts utilized to rotate the propellers of a ship. The bearing is made of a bronze bearing back and bearing material such as rubber. Load bearing lands are separated from each other by grooves.

PB-166 907 Div. 31
CFSTI Prices: HC$10.60

Bureau of Ships, Washington, D. C.
DESIGN DATA BOOK.
1 Mar 64, 756p Unclassified report

Complete set available until supply is exhausted. Individual documents comprising the volume are also available as PB-166 908 through PB-166 944.

Descriptors: (*Ships, Construction), Data, Design, Reports, Standards, Riveted joints, Reinforcing materials, Submarines, Ship decks, Aircraft carriers, Ship structural components, Shock (Mechanics), Loading (Mechanics), Ventilation ducts, Air conditioning equipment, Heating elements, Driers (Apparatus), Fuel consumption, Heat transfer coefficients, Shafts, Sprinklers, Electric power production, Voltage regulators, Lighting equipment, Marine safety equipment, Navy.

The book contains design procedures, criteria, and background information pertaining to the construction of ships and the design, selection, and installation of systems, equipment, and components of ships that are generally acceptable to the Bureau of Ships. The book aims to (1) establish design standards for those systems or components which are distinctly naval; (2) permit comparison of designs submitted by various contractors; (3) furnish standard data and calculations useful in original designs; and (4) provide background information and general concepts useful to persons engaged in ship design and construction. The contents of the book are not specifications and are not intended to have the force of mandatory requirements. However, they may be used to indicate methods of calculation, presentation of data, etc., in those cases where Detail Specifications so require. (Author)

PB-166 908 Div. 31, 17, 26
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
RIVETING, STEEL OR ALUMINUM.
Design Data Sheet,
by T. SooHoo. 11 Jan 56, 11p DDS0902-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Riveted joints, Steel), (*Aluminum, Riveted joints), Data, Watertight fittings, Design, Standards, Tables, Shear stresses, Tensile properties, Navy.

This design data sheet is intended to provide aids for the design of riveted joints. While riveting of steel naval vessels has largely been superseded by welding, riveting has application to other materials, such as aluminum. Therefore, the experience acquired in steel riveting is retained here, both for direct application as required, and also for guidance in riveting of other materials.

PB-166 909 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
REINFORCEMENT OF OPENINGS IN STRUCTURE OF SURFACE SHIPS, OTHER THAN IN PROTECTIVE PLATING.
Design Data Sheet.
14 Mar 50, 5p DDS1100-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship structural components, Reinforcing materials), Structural properties, Metal plates, Ventilation ducts, Pipes, Stresses, Rings, Physical properties, Navy, Data.

These design data were prepared for guidance in designing reinforcement around openings in structural members of naval vessels. Such openings are made: (a) To lighten members. (b) For access or inspection. (c) To allow passage of wiring, piping, and ventilation ducts. Every opening in a stressed area of a structural member causes stress concentrations. If opening is large in proportion to width of member, or too near an edge, stress concentration is increased. If size or location of opening is such as to unduly impair the strength of an important member, measures should be taken to reduce the stress in way of the hole. This may be done: (d) By changing location of opening. For example, in a beam, locate holes near neutral axis. (e) By changing shape of opening. (f) By fitting an insert plate around opening. (g) By fitting a reinforcing ring around opening. The purpose of such reinforcement is to concentrate extra material around opening, close enough to plane of plate so that it will deform with loaded plate, thus absorbing energy and reducing strains around opening. The rules below deal with this type of reinforcement.

PB-166 910 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
OPENINGS IN DECKS AND BULKHEADS FOR STUFFING TUBES AND PIPES.
Design Data Sheet.
8 Dec 51, 5p DDS1100-2 Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship decks, Structural properties), (*Bulkheads, Structural properties), Pipes, Ducts, Structural parts, Metal plates, Steel, Design, Data, Navy.

PB-166 911 Div. 31
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Ships, Washington, D. C.
STRUCTURAL DESIGN OF FLAT PLATING AND STIFFENERS SUBJECT TO WATER PRESSURE.
Design Data Sheet.
17 Nov 55, 33p DDS1100-4
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship structural components, Design), Specifications, Reinforcing materials, Stresses, Metal plates, Loading (Mechanics), Hydrostatic pressure, Equations, Navy, Data.

Extreme cases where it may be necessary to calculate larger plastic deformations, the data in reference (d) may be used.

PB-166 912 Div. 31
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Ships, Washington, D. C.
STRENGTH OF STRUCTURAL MEMBERS.
Design Data Sheet, printing no. 2,
by L. K. Losee. 7 Mar 56, 27p DDS1100-3
Unclassified report

Printing includes modification of Jan 57.
Rept. also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship structural components, Design), Specifications, Standards, Data, Supports, Stresses, Loading (Mechanics), Buckling (Mechanics), Compressive properties, Steel, Aluminum alloys, Brass, Bronze, Graphics, Navy.

Uniform standards are provided for design calculations which are common to a number of different structural components of ships. The data supplement information given by design data sheets for specific types of structure. In general, the design criteria applied here are in substantial agreement with those used in recent years by the Bureau of Ships. It is emphasized, however, that factors of safety and other design features must conform to applicable specifications. Charts are provided to show strength of columns and panels of plating, under various loadings, for a number of commonly used materials.

PB-166 913 Div. 31
CFSTI Prices: HC$3.00 MF$0.75

Bureau of Ships, Washington, D. C.
DESIGN OF FOUNDATIONS AND OTHER STRUCTURES TO RESIST SHOCK LOADINGS.
Design Data Sheet.
1 Mar 64, 56p DDS9110-7 Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship structural components, Shock resistance), (*Loading (Mechanics), Shock resistance), Ship hulls, Impact shock, Vibration, Explosion effects, Deformation, Stresses, Numerical analysis, Data, Design, Energy, Statistical data, Navy.

PB-166 914 Div. 31
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Ships, Washington, D. C.
STAYED POLEMAST.
Design Data Sheet,
by L. K. Losee. 1 Sep 57, 48p DDS1702-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship structural components, Design), Standardization, Antenna masts, Loading (Mechanics), Statistical data, Mathematical analysis, Supports, Tables, Deflection, Navy, Data.

The Design Data Sheet is issued for the purpose of simplifying and standardizing design calculations for a stayed polemast. Since such a structure is statically indeterminate and many of the loadings are dependent on the structure itself, there is a considerable element of trial and error inherent in the design. The procedure followed is intended to reduce this element to a minimum and to facilitate the analysis so that possible beneficial changes in design can be readily evaluated. (Author)

PB-166 915 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
TRIPOD MAST.
Design Data Sheet,
by L. K. Losee. 1 Oct 58, 16p DDS1701-2
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship structural components, Design), Stresses, Loading (Mechanics), Structural properties, Supports, Deflection, Analysis, Navy, Data.

Contents:
Arrangement of tripod legs
Bracing of struts
Deflection method of analysis
Secondary stresses
Stresses in mast of uniform cross section, neglecting deflection of stay-point
Illustrative calculations for an aluminum tripod mast.

PB-166 916 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
FOUR-LEGGED MAST.
Design Data Sheet.
1 May 60, 19p DDS1701-3
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship structural components, Design), (*Antenna masts, Ship structural components), Loading (Mechanics), Distribution, Deflection, Deformation, Moments, Stresses, Analysis, Tables, Radar antennas, Navy, Data.

A four-legged mast, sometimes referred to as a quadrupod or a lattice-type mast, consists of four, essentially vertical members, joined together by horizontal and diagonal bracing. The four trusses formed by the members provide fairly rigid support at each panel point. Such a structure is suitable for carrying radar antennas and other equipment which cannot be concentrated within a small area. The advantage of a four-legged mast over a polemast or tripod is that the principal forces and moments, including torsional effects, are resisted by axial reactions of the members. Bending moments are substantially eliminated. But because stresses in most members are determined by the moments on the mast as a whole, the analysis is similar in some respects to that of an unstayed polemast.

PB-166 917 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
LONGITUDINAL STRENGTH CALCULATION.
Design Data Sheet.
27 Dec 50, 16p DDS2900-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ship hulls, Loading (Mechanics)), Shear stresses, Buoyancy, Moments, Flexible structures, Deflection, Statistical data, Mathematical analysis, Design, Navy.

The hull is assumed to be a girder which is loaded statically and which behaves in accordance with the common theory of flexure. The downward loads on the girder are the weights of the component parts of the ship and the weights carried by the ship. The upward loads on the girder are the forces of buoyancy. Flexure in two directions is considered. In the hogging condition, there is excess buoyancy amidships, causing the middle portion of the ship to bend upward. In the sagging condition, there is deficient buoyancy amidships, causing the middle portion of the ship to bend downward.

PB-166 918 Div. 31, 14, 17
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
UNIT WEIGHTS OF MATERIALS.
Design Data Sheet.
10 Mar 55, 11p DDS2901-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Materials, Ships), Data, Weight, Aluminum, Aluminum alloys, Copper, Copper alloys, Magnesium alloys, Nickel, Nickel alloys, Titanium, Iron, Steel, Liquids, Gases, Plastics, Solids, Woods, Tables, Specifications, Navy.

PB-166 919 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
PASSIVE ANTI-ROLL TANKS.
Design Data Sheet, revised ed.
1 Nov 63, 19p DDS9290-4
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.
Revision of rept. dated 1 Sep 62.

Descriptors: (*Ships, Construction), (*Ballast tanks, Stabiliz ation), (*Stabilization systems, Design), Rolls, Inhibition, Nozzles, Ballast, Navy.

PB-166 921 Div. 31, 13
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
AIR CONDITIONING (VENTILATION, HEATING, AND MECHANICAL COOLING) HEAT LOADS AND SPACE REQUIREMENTS.
Design Data Sheet.
27 Jul 50, 19p DDS3801-1
Unclassified report

Also included in Design Data Book, 1 Mar 65, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Air conditioning equipment, Ships), (*Cooling and ventilating equipment, Design), Data, Atmospheric temperature, Sea water,

Lighting equipment, Ship structural components, Heaters, Temperature sensitive elements, Heat transfer, Naval personnel, Graphics, Navy.

The report contains basic data on weather-air and sea-water temperatures, transmission, lighting, personnel, replenishment air, equipment, ventilation quantities, and mechanical cooling. Detail requirements are also presented for the following: propulsion and power-generating rooms; fire pump rooms (electric drive); shops and working spaces; commissary spaces, ammunition spaces; living spaces; medical and dental spaces; washrooms and water closet spaces; laundry; hydraulic-electric machinery rooms; gasoline spaces; spaces contiguous to gasoline voids or cofferdams; inflammable material, storage or handling spaces; communication and control spaces; wiring passages; stowage spaces; trash-burner room; mechanical cooling and refrigeration-machinery rooms; pilot house and conning stations; shaft alleys; bottled-gas stowage; gun mounts and turrets; hangars; ship's store fountain; oxygen-nitrogen producer rooms; gun-cleaning rooms; garbage grinder room; and windlass room.

PB-166 922 Div. 31, 13
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
A METHOD FOR DETERMINING THE SIZE OF VENTILATION DUCTS.
Design Data Sheet.
18 Jan 51, 14p DDS3801-3
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ventilation ducts, Design), Pressure, Distribution, Friction, Velocity, Numerical analysis, Graphics, Tables, Data, Specifications, Navy.

The design data sheet presents an approved method of sizing ventilation ducts. In a satisfactory design, ducts are so proportioned that the required air quantities are delivered at the terminals. Since ventilation systems are generally tested late in the construction schedule, corrective measures are expensive from both a time and material standpoint. Careful initial design will minimize these corrective measures.

PB-166 923 Div. 31, 13
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
DESIGN OF SLOTTED DUCT TERMINALS.
Design Data Sheet.
1953, 11p DDS3801-4
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Ventilation ducts, Design), (*Heaters, Ships), Air conditioning equipment, Submarines, Specifications, Navy, Data.

PB-166 924 Div. 31, 13
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
METHODS OF HEATING: DESCRIPTION AND SELECTION OF HEATING EQUIPMENT.
Design Data Sheet.
1955, 25p DDS3802-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Heating, Ships), (*Heaters, Design), Air conditioning equipment, Temperature control, Heat transfer, Heating elements, Thermostats, Arctic regions, Data, Specifications, Navy.

Contents:
Direct heating systems
Unit heaters
Indirect heating systems
Recirculating systems
Equipment description
Equipment selection
Controls.

FB-166 928 Div. 31, 10
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
CALCULATION OF SURFACE SHIP ENDURANCE FUEL REQUIREMENTS.
Design Data Sheet.
1 Nov 63, 3p DDS9400-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Fuel consumption, Ships), Military requirements, Navy, Design, Data, Performance (Engineering).

This report contains a Design Data Sheet that outlines the procedure followed by the Bureau of Ships to determine the necessary fuel tankage for conventionally powered steam, diesel,or gas turbine propelled ships or craft.

PB-166 929 Div. 31
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Ships, Washington, D. C.
SHAFT STRUTS.
Design Data Sheet,
by L. K. Losee. 5 Sep 57, 27p DDS4301-2
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Shafts, Supports), (*Supports, Shafts), Fairings, Loading (Mechanics), Navy, Mathematical models, Data, Design.

The report discusses considerations pertinent to design of shaft struts. Although actual loadings on the struts cannot be accurately predicted, the empirical loading formulas in the report reflect probable effects of the more important variables involved in design of the ship and of the struts themselves. Loadings can be determined from these formulas unless other requirements are stated in specifications.

PB-166 930 Div. 31
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Ships, Washington, D. C.
PROPULSION SHAFTING.
Design Data Sheet.
1 Jan 60, 28p DDS4301
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.
Supersedes DDS-4301 dated 1 May 57.

Descriptors: (*Ships, Construction), (*Shafts, Ships), Design, Military requirements, Navy, Stresses, Data, Materials, Mechanical properties, Mathematical models.

The basis for the design of propulsion shafting for naval ships are given.

PB-166 931 Div. 31
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Ships, Washington, D. C.
STEAM CONDENSERS.
Design Data Sheet.
15 Oct 53, 5p DDS4601-1
Unclassified report

Also included in Design Data Book, 1 Mar 64, PB-166 907, $10.60, available from Clearinghouse until supply is exhausted.

Descriptors: (*Ships, Construction), (*Steam condensers, Ships), Data, Design, Heat transfer, Military requirements, Navy, Mathematical analysis, Mathematical models.

General and detail design requirements are presented for ship steam condensers.

32. Miscellaneous Arts and Sciences

Patent 3,169,277 Div. 32, 26

APPARATUS FOR INDIVIDUALIZING COTTONSEED.
Patent assigned to Agriculture,
by Leo L. Holzenthal, Edward A. Gastrock, and William T. Gentry, Jr. 16 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Cotton, Seeds), Separation, Cleaning, Machines.

The apparatus is designed as a piece of auxiliary equipment operating as an adjunct to a cottonseed cleaning device. The structure includes a housing with four walls and two rotors having parallel axes and journalled in bearings secured to the front and rear walls. Rubber coated spikes are mounted on the rotors.

PB-166 851 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

Itek Corp., Waltham, Mass. Information Services Dept.
SUMMARY OF A RESEARCH PROGRAM ON INFORMATION SEARCHING SYSTEMS.
Jan 59 5p Unclassified report

Research supported by National Science Foundation.

Descriptors: (*Information retrieval, Automation), (*Subject indexing, Automation), Dictionaries, Language.

The program has the following features. (1) Index data for subject matter are prepared for storage by a procedure of normalized representation applied to expressions in natural language. (2) The normalized or 'L-representation' uses concepts and methods available in modern linguistics and symbolic logic. (3) Procedure of normalization is supported by general and special rules, the latter being kept in a manipulable store, an L-dictionary or 'indexicon.' The dictionary correlates elements of non-normalized expressions such as words with their L-represented counterparts. (4) Formulation of subject-matter components of searches is supported by general rules, the L-dictionary, and an L-thesaurus or 'semantiicon'. The general rules are those for L-representation augmented by rules for planning searches. The L-dictionary is for L-representation. The L-thesaurus prescribes the method for relating normalized representations (resulting from application of general rules) to stored index data on the basis of informative meaning. (5) L-indexing is based on L-representation. Where an expression is to be treated as a function expression, the specific grammar of L-representation provides a pattern of 'places' or 'roles' into which certain accompanying expressions (i.e. those treated as argument expressions) are to be fitted in the process of their normalization.

PB-166 867 Div. 32
CFSTI Prices: HC$4.00 MF$0.75

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PAPERS. 54. THE ELEMENTARY TRANSFORMATIONS, by Z. S. Harris. 1964, 112p Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Language, Analysis), Classification, Theory.

PB-166 868 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. 30. ENGLISH TRANSFORMATION LIST: KERNEL LIST,
by Zellig S. Harris. 1960, 8p Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Language, Analysis).

PB-166 869 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PAPERS. 55. NOMINALIZATIONS,
by Z. Vendler. 1964, 82p Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Language, Analysis), Classification.

PB-166 870 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. 31. ORDER OF ADJECTIVES,
by Zeno Vendler. 1958, 16p

Unclassified report

Research Supported by the National Science Foundation, Washington, D. C.
Available copy will not permit fully legible reproduction.

Descriptors: (*Language, Analysis).

The analysis leads to the conclusion that the natural order of adjectives is as follows: exclamatory adjectives (beautiful); adverb like (big); verb like (split); and noun like (bulky, yellow, catlike, or American).

PB-166 871 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. 22. PRE-ADJECTIVALS IN THE ENGLISH NOMINAL PHRASE,
by Seymour Chatman. 1958, 34p

Unclassified report

Research supported by the National Science Foundation, Washington, D. C.

Descriptors: (*Language, Analysis).

PB-166 872 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
TRANSFORMATION AND DISCOURSE ANALYSIS PROJECTS. 32. A SKETCH OF A PROCEDURE FOR DECOMPOSING A COMPLEX SENTENCE INTO ITS KERNELS,
by Aravind K. Joshi. 1960, 7p

Unclassified report

Research supported by the National Science Foundation, Washington, D. C.
Available copy will not permit fully legible reproduction.

Descriptors: (*Language, Analysis).

Contents:
Classification of transformations
Kernels and complex sentences
Steps in the decomposition

PB-166 873 Div. 32
CFSTI Prices: HC$4.00 MF$1.00

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. 56. TRANSFORMATIONAL DECOMPOSITION OF CHINESE, WITH ENGLISH PARALLELS: A PRELIMINARY FORMULATION,
by John DeFrancis. Oct 64, 142p

Unclassified report

Research supported by the National Science Foundation, Washington, D. C.

Descriptors: (*Language, Analysis).

The starting point of the study consists of eighty-eight Chinese sentences. These sentences occur in a textbook (John DeFrancis. 'Beginning Chinese', revised edition. New Haven, Yale Univ. Press, 1963, p. 424-427) as summary illustrations of all the grammatical patterns presented in the text and as such provide a fairly comprehensive coverage of the major syntactical structures of Chinese. The English sentences are translations of the Chinese sentences. The decompositions of the Chinese and English sentences are presented on the same page so as to facilitate comparison.

PB-166 874 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. 16. WORD AND WORD-COMPLEX DICTIONARIES,
by Lila Gleitman. 1964, 17p

Unclassified report

Descriptors: (*Language, Analysis), (*Pattern recognition, Programming (Computers)), Dictionaries, Character recognition, Classification, Documentation, Magnetic tape, Automatic.

The operations described in this report are (1) pre-editing and reading the text into the machine; (2) recognition and classification of characters and sequences of characters into word- and sentence-length stretches; (3) discovery of the grammatical classifications of words: the word-dictionary and its use; (4) format of the text to be analyzed; and (5) discovery and disposition of certain sequences of words: the word-complex-dictionary and its use.

PB-166 905 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

Office of Scientific Information Service, National Science Foundation, Washington, D. C.
SUMMARY OF STUDY CONFERENCE ON EVALUATION OF DOCUMENT SEARCHING SYSTEMS AND PROCEDURES, 2-3 OCTOBER, 1964, MARVEL HALL, AMERICAN CHEMICAL SOCIETY BUILDING, WASHINGTON, D. C.
10 Feb 65, 38p

Unclassified report

Descriptors: (*Documentation, Information retrieval), (*Information retrieval, Symposia), Libraries, Indexes, Reports, Identification, Test methods, Computers, Simulation.

The conference was arranged by the National Science Foundation (NSF) to review work on the testing and evaluation of document searching systems and procedures and to consider promising directions for future work in this area. The scope of the conference was limited to systems and procedures for searching for documents that satisfy particular search specifications. There was no intent to limit the notion of system--examples might be the tools and procedures used by reference libraries and information centers to locate wanted documents; indexes and other tools and their modes of use by users of various kinds; the staff, equipment and procedures that comprise partially mechanized document searching systems; and more fully automatic document-analysis-and-searching procedures under development. The scope of the conference did not include systems and procedures for organizing or searching for information items themselves.

PB-166 906 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Little (Arthur D.) Inc., Cambridge, Mass.
CENTRALIZATION AND DOCUMENTATION.
Final rept., ed. 2, app.
Jun 64, 19p Rept. no. C-64469, app.
PB 166 415 app.

Unclassified report

Descriptors: (*Information retrieval, Mathematical analysis), (*Subject indexing, Effectiveness), Search theory, Set theory, Algebra, Probability, Correlation techniques, Errors, Documentation.

The purpose of the report is to provide algebraic expressions which describe the performance characteristics of three specific schemes of coordinate document information retrieval. These expressions are formulated in terms of probabilities which can be measured through observation of a given retrieval system. First, assumptions as to the nature of the document collection, the retrieval systems and the requirements of the users are described in detail. Several retrieval performance measures are then derived, and examples of their application exhibited. (Author)

33. Transportation

PB-166 878 Div. 33
CFSTI Prices: HC$7.00 MF$2.00

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A PROJECTION OF TECHNOLOGY APPLICABLE TO THE FUTURE HIGHWAY SYSTEM OF THE BOSTON-WASHINGTON CORRIDOR.
2 Oct 64, 400p Rept. no. CAL-VJ-1913-V-1
Contract Cc6245

Unclassified report

Descriptors: (*Urban areas, Roads), (*Roads, Civil engineering), (*Civil engineering, Roads), (*Transportation, Research program administration), United States Government, Passenger vehicles, Cargo vehicles, Standards, Safety, Traffic, Motor vehicle operators, Safety devices, Feasibility studies.

The objectives of this study have, therefore, been (1) to review the existing trends in highway-oriented technology, (2) to explore those aspects of existing trends, and developments in the field, that could be stimulated to achieve advantageous developments, and (3) to select certain innovations components and system concepts that, principally on the basis of technical and effectiveness considerations, appear to be promising for further research and development, especially as related to the Megalopolitan region. This study has been of relatively short duration and modest effort (six months and about three engineers). Because of these limitations, the system concepts chosen as worthy of further exploration are outlined in the merest skeletal form -- general technical feasibility is based on judgment and experience and in each system case, a great deal of engineering research, preliminary design study, and experimental prototype development will be necessary to 'put meat on the bones' to allow major policy decisions to be made by regional planners.

PB-166 879 Div. 33
CFSTI Prices: HC$4.00 MF$1.00

Klauder (Louis T.) and Associates, Philadelphia, Pa.
POSSIBLE IMPROVEMENTS TO RAILROAD PASSENGER SERVICE BETWEEN NEW YORK AND WASHINGTON.
Preliminary engineering rept.,
by Louis T. Klauder. 1 Jun 64, 135p
Contract Cc6238

Unclassified report

Rept. on Washington-Boston Corridor Research Proj.

Descriptors: (*Railroads, Urban areas), (*Urban areas, Railroads), (*Transportation, Research program administration), United States Government, Civil engineering, Railroad tracks, Railroad cars, Traffic, Scheduling, Maintenance, Costs, Safety, Feasibility studies.

Studies are made of the possible service improvements on the Pennsylvania Railroad between Washington, D. C. and New York, N. Y. to provide in greater depth an analysis of the operational aspects of such service, the required alterations to existing facilities, and the equipment design features, as well as calculations of the cost of improvements and improved operations between these two cities.

PB-166 880 Div. 33
CFSTI Prices: HC$4.00 MF$1.00

Klauder (Louis T.) and Associates, Philadelphia, Pa.
POSSIBLE IMPROVEMENTS TO RAILROAD PASSENGER SERVICE BETWEEN NEW YORK AND WASHINGTON.
Supplemental engineering rept.
12 Jun 64, 123p
Contract Cc6238

Unclassified report

Rept. on Washington-Boston Corridor Research Proj.
Supplemental rept. to preliminary rept. dated 1 Jan 64.

Descriptors: (*Railroads, Urban areas), (*Urban areas, Railroads), (*Transportation, Research program administration), United States Government, Traffic, Scheduling, Railroad tracks, Railroad cars, Maintenance, Safety, Costs, Feasibility studies, Civil engineering.

The possibility and the cost of establishing two and one-half hour passenger service between New York and Washington was studied, using the tracks of the Pennsylvania Railroad. The results of that study were presented in a 'Preliminary Engineering Report on Possible Improvements to Railroad Passenger Service Between New York and Washington,' dated June 1, 1964 (PB-166 879). In this report the possibility and cost of establishing two and one-quarter and two-hour service between these same two cities are studied.

PB-166 881 Div. 33, 30
CFSTI Prices: HC$5.00 MF$1.00

Smith (Wilbur) and Associates, New Haven, Conn.
HIGHWAY TRAVEL IN WASHINGTON, NEW YORK, BOSTON MEGALOPOLIS,
by Wilbur S. Smith. 15 Nov 63, 176p

Unclassified report

See also PB-166 878.

Descriptors: (*Roads, Urban areas), (*Urban areas, Roads), (*Transportation, Research program administration), United States Government, Civil engineering, Passenger vehicles, Cargo vehicles, Traffic, Density, Mathematical models, Economics, Sociology, Feasibility studies.

A mathematical model was developed and tested for synthesizing current highway travel patterns in the corridor on an intercity basis. Such factors as population, vehicle registration, conventional land use, economic levels, employment, and specific major generators of intercity travel were included.

PB-166 882 Div. 33, 30
CFSTI Prices: HC$4.00 MF$1.00

National Academy of Sciences-National Research Council, Washington, D. C. Committee on Science and Technology.
SCIENCE AND TECHNOLOGY IN THE RAILROAD INDUSTRY.
Aug 63, 133p
Contract Cc6085

Unclassified report

Descriptors: (*Railroads, Industrial research), (*Industrial research, Railroads), (*Transportation, Research program administration), United States Government, Economics, Sociology, Reviews.

A study is made of the present use of science and technology in the railroad industry and the potential for further effort. This evaluation includes applications of the physical and social sciences, and considers the impact of research and development upon the physical, economic, and social aspects of the railroad and transportation industry, its labor forces, and the community it serves.

PB-166 883 Div. 33
CFSTI Prices: HC$5.00 MF$1.25

Systems Analysis and Research Corp., Boston, Mass.
FEASIBILITY AND COST OF EXPANDED INTERCITY AIR SERVICE IN THE WASHINGTON-BOSTON CORRIDOR.
1963, 199p

Unclassified report

Descriptors: (*Air transportation, Urban areas), Feasibility studies, Airports, Commercial planes, Armed forces transportation, Air traffic control systems, Sociology, Economics, Population, Costs, Labor, Consumption, Industrial production, Statistical data, Tables.

This study has been undertaken in connection with the general program of the Under Secretary of Commerce for Transportation, U.S. Department of Commerce, to evaluate the present and future needs of the Washington-Boston Corridor for intercity passenger services and facilities. The study is concerned specifically with air transport services and facilities and is primarily directed to providing the preliminary foundation for a judgment 'as to what kinds of additions to and improvements of airports, airway system, and aircraft will best meet the needs of the intercity air passenger market, in 1980, in the Washington-Boston area.'

PB-166 884 Div. 33, 30
CFSTI Prices: HC$6.00 MF$1.50

Systems Analysis and Research Corp., Boston, Mass.
DEMAND FOR INTERCITY PASSENGER TRAVEL IN THE WASHINGTON-BOSTON CORRIDOR.
1963, 288p

Unclassified report

Descriptors: (*Transportation, Research program administration), (*Urban areas, Transportation), Economics, Sociology, United States Government, Civil engineering, Feasibility studies.

The study has four main objectives: (1) Identification and measurement of the principal factors influencing intercity passenger demand; (2) identification and measurement of the principal factors influencing the division of intercity passenger demand by mode; (3) projection of intercity passenger demand in the corridor through 1980, and (4) delineation of further study requirements.

PB-166 885 Div. 33, 32
CFSTI Prices: HC$6.00 MF$1.50

United Research, Inc., Cambridge, Mass.
INTERCITY FREIGHT TRANSPORTATION REQUIREMENTS OF THE WASHINGTON-BOSTON CORRIDOR IN 1980.
Final rept.
Nov 63, 243p
Contract Cc6224

Unclassified report

Descriptors: (*Transportation, Cargo), (*Urban areas, Transportation), Traffic, Roads, Air transportation, Shipping (Marine), Vehicles, Railroads, Sociology, Economics, Population, Labor, Industries, Industrial production, Costs, Tables.

The purpose of this research is to study the intercity freight transportation requirements of the Washington-Boston Corridor in 1980, and the improvements required in transporting commodities through and within the corridor by land, water and air. The study objectives are (1) to estimate in terms of traffic flows, the current total demand for intercity freight commodity transportation existing in the corridor; (2) to describe in qualitative terms the commodities making up these traffic flows; (3) to show how the current demand for commodity freight transportation is being met today; (4) to identify and establish a relationship between significant economic and sociological factors and levels of transportation demand; (5) to identify significant changes in these relationships which may occur in the future as a result of technological innovation; (6) to project the economic and sociological demand factors in 1980; (7) to forecast for 1980, total intercity freight transportation demand (as expressed in terms of traffic flows); (8) to allocate this total commodity flow to the various modes on the basis of foreseeable intermodal competitive relationships; (9) to identify and describe the economic and technical characteristics of the various ways and vehicles which may be made available to freight carriers by 1980; and (10) to describe the methodology by which the cost and technical characteristics of ways and vehicles could be related to possible future demand characteristics.

PB-166 886 Div. 33, 32
CFSTI Prices: HC$6.00 MF$1.25

MRD Div., General American Transportation Corp., Niles, Ill.
WASHINGTON-BOSTON TRANSPORTATION STUDY. PART B. FEASIBILITY AND COST OF IMPROVED RAILROAD SERVICE.
Final rept.,
by Andrew A. Arentz, Jr., Fred W. Sander, and Richard E. Pages. Nov 63, 228p
Contract Cc6207

Unclassified report

Descriptors: (*Transportation, Railroads), (*Railroads, Transportation), Passenger vehicles, Feasibility studies, Urban areas, Automation, Railroad cars, Railroad tracks, Costs, Population, Economics, Tables.

Conclusions:
A large portion of the total intercity passenger market in 1980 in the Washington-Boston corridor can be effectively and economically served by improved railroad service. To serve the 1980 market, major improvement of existing rail systems does not appear to be economically feasible. The most promising long-range solution to the 1980 corridor problem is a new high-speed high-frequency rail-riding auto ferry. An immediate improvement of the present rail systems in the corridor should be made with the object of achieving efficient, dependable, and economical operations. This improvement should be in the lower improved-speed ranges contemplated in the study and should be compatible with the structures of the railroads as they already exist. It should also be predicted on new comfortable equipment that will be consonant with future local and commuter requirements.

PB-166 887 Div. 33, 30
CFSTI Prices: HC$4.00 MF$1.00

Bingham (S. H.), New York.

HIGH-SPEED RAILROAD OPERATIONS WITHIN THE NEW YORK METROPOLITAN AREA IN CONNECTION WITH HIGH-SPEED SERVICE BETWEEN WASHINGTON, D. C. AND BOSTON, MASSACHUSETTS,
by S. H. Bingham. 15 Nov 63, 156p

Unclassified report

Rept. on Research Project.

Descriptors: (*Railroads, Urban areas), (*Urban areas, Railroads), (*Transportation, Research program administration), United States Government, Civil engineering, Railroad tracks, Railroad cars, Compatibility, Aerodynamic characteristics, Traffic Scheduling, Costs, Feasibility studies, Maps.

One of the main objectives was the determination of the limits to high-speed operation imposed by existing rail route alignments and profiles, based upon studies of existing railroad valuation track maps. These studies were translated into the charted changes, presented herein, which would permit minimum train speeds of 100 miles per hour. In addition to this, four alternate routes were studied to develop alignments which give promise of greater speed capabilities within the area. All the routes studied, including two which are not compatible with conventional rail operations, are shown in a Map.

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